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Notes for Convocation Address
by Arthur J. R. Smith,
Chairman, Economic Council of Canada,
at the University of Calgary, May 26, 1970

THE FEARSOME WORLD OF CHANGE AND CHOICE

It is a great privilege to have been honoured with a degree from the University of Calgary -- which, even in today's world of dramatic university growth, stands out as one of the most vital and rapidly expanding universities in Canada. In the past few years I have been a frequent visitor to this province and this city. In the future, I will feel much less a visitor, and much more at home.

One of the traditions of such an occasion is that the Convocation address should contain congratulations to those who have -- either by hard work or good luck -- successfully completed the requirements for a university degree. I am pleased that I have the opportunity to maintain this tradition, and I would like to extend my most warm and sincere best wishes to all of you who are graduating today.

Another tradition is that the Convocation address should consist of some pious and platitudinous advice about the bright and promising world which the graduates are entering. This is a tradition which I do not propose to follow. Instead, I intend to talk about The Fearsome World of Change and Choice.

My brief remarks are centred on two themes. One is that an increasing desire among young people to influence the future progress of our society is coinciding with accelerating opportunities for them to do so. The other is that in today's fearsome world of change and choice, there are some very tough prerequisites in order to have such influence.

Both of these themes are based on the underlying presumption that those of you who are today crossing the threshold from the "world of education" to the "world of work and decisions" have not only a *desire* but also the *will* to create a better society. This implies a recognition of the importance of action and decision-making, policy formulation and implementation, and the closely related activities of problem-solving and policy advice. There is, of course, greater need and greater scope in today's world for creating new knowledge, developing new theory, extending fundamental research, improving information and techniques of analysis -- all of these can and should have an important bearing on the future of man and his world. But the course of the future, in so far as it is determined by man, will essentially be decided by the *application* of knowledge rather than by its *creation*.

In Canada in the 1970's, three basic factors will be working powerfully in the direction of facilitating swift progress by young people towards much greater influence on the changes and choices affecting the future of our society. The first is the present unusual age structure of our population. In the 1970's we will have *no growth* in the numbers of Canadians in the 40-50 age group. In contrast, we will have an increase of almost 40 per cent

(or an increase of about 1 3/4 million young persons) in the 20-35 age group. Because of the latter, the 1970's will be a decade of very large potential growth and development in our economic and social system -- in government and business, in education and health care, and in many other activities. There will therefore be unprecedented needs and opportunities for young people to move forward rapidly into positions in which they will have large responsibilities and influence in our society.

Second, it is not merely the increase in numbers but, even more, the increase in the knowledge and skills of young people that will contribute to the quicker assumption of such responsibilities and influence. During the 1960's, tremendous efforts have been made in Canada to strengthen and expand our educational system (incidentally, not without considerable current sacrifices, in terms of the "giving up" of other uses to which the scarce resources flowing into education might have been put). In particular, Canadians from coast to coast have been prepared to support an extraordinary build-up in the development of more highly educated manpower. For example, the annual flow of university degrees awarded has approximately tripled from about 20,000 in 1960 to about 60,000 this year. And a huge further expansion is in prospect. The Economic Council has estimated that the total annual rate of graduations from the universities and the community colleges, taken together, may be approaching a quarter of a million by 1980 (about 150,000 from the universities and 100,000 from the community colleges). The modern society is coming to run increasingly on knowledge, and there is a growing recognition that young people

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emerging from the educational system will provide the essential knowledge and skills on which the future of our society will depend.

A third important factor enlarging the role which more highly educated and skilled young people can be expected to play in the coming decade is that a rising proportion of the greatly increased flow of graduating students will be moving out of the education sector itself. The highest *rates* of expansion in our institutions of higher learning are now behind us. In the 1970's, we will have almost steadily moderating rates of increase, both in enrolments and in staffs in the institutions of higher learning. And this will be occurring side by side with very substantially increased numbers of, and a steep rate of growth in, the flows of young people with advanced degrees from the universities. This means that a greatly increased share of our total "knowledge power", with its accompanying influence on decisions, will be available more widely throughout our society beyond the educational system -- for government, business, and a great variety of private organizations. Moreover, the explosion of knowledge is tending to break down autocratic and highly centralized decision-making processes, so that knowledge workers are experiencing a rising influence on managerial functions.

Thus, both the needs and the opportunities are clear for young people to play a greatly enlarged role in shaping this country's future in the 1970's -- at the same time, young people today are generally far better equipped than ever before to participate in bringing about constructive change and reform.

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How can they play this role most effectively? This brings me to my second major theme -- the essential prerequisites for effective influence on society's progress. Let me suggest five.

The first is a frank realization that there are no simple solutions to the complex problems of modern societies. If there were, they would be quickly discovered. Complex problems require complex solutions, and the society of the future will be even more complex than our present society. To address ourselves to increasingly complex needs and problems will require taxing efforts, based on a perceptive capacity to ask the right questions, to master relevant facts and analysis, and to exercise judgment about complicated issues and interrelationships.

The second prerequisite is a need for hard and clear thinking about goals and objectives. If we are to have any "progress" in our society at all, the first question is "Progress towards what?". And if discussion about policy is to have any meaning, it can only take place on the basis of an answer to the question "Policy for what?". It sounds very simple to say that we need goals and objectives towards which we should be steering and shaping our society. But the establishment and articulation of meaningful goals is in fact an extraordinarily difficult task. And it is surprising how much policy and planning and action takes place without clearly defined goals, and how little attention has been paid to questions relating to the consistency and reconcilability of goals with each other. Here is a basic and pressing challenge that is absolutely fundamental in conditions in which man is rapidly acquiring increased knowledge giving him larger power to shape his future.

A third prerequisite is better communication between experts and decision-makers. This requires, among other things, improved clarity of presentation of knowledge and ideas. In most fields of knowledge we have been rushing headlong into more specialized terminology and more technical and complicated formulation of ideas. Too often, the professional specialist fails to get relevant knowledge to the points where it is particularly needed and should be effectively used, because he fails to spend enough time and effort to make it intelligible to users who may not themselves be experts, and to convince potential users of its real relevance. More generally, there is also a need for greatly improved processes of translating and communicating a growing range of critically important knowledge about man and his world to the wider public in our democratic society. For in many areas of decision-making, timely and appropriate actions may be very difficult, if not impossible, to undertake in the absence of wide public understanding about the real issues involved. As the noted Greek planner Doxiadis has so aptly put it, "A planner who is unable to sell his plan to the people and their politicians has no plan at all -- just a piece of paper." Inadequate emphasis on the importance of developing high-quality articulation to go with high-quality professional competence is, in my judgment, a serious deficiency in the present educational system -- and one to which many young people will need to give special remedial attention.

Fourth, it is synthesis rather than specialization which will lie at the centre of effective problem-solving and decision-making. Francis Bacon, in *The Advancement of Learning*, divided scientists into the pioneers, who dig, and the smiths, who refine

and hammer. It is abundantly clear that in today's world we are producing very large numbers of pioneers, but not nearly enough smiths. None of the major problems of the world of today and tomorrow are going to be solved by specialists working alone. Poverty and regional disparities, pollution and housing, urban congestion and alienation, foreign relations and domestic tensions -- in these and countless other areas of problems there is a desperate need for the services of high-quality generalists and of effectively operating multi-disciplinary teams.

Finally, there is a great need for flexible adjustment to change, along with a recognition that accelerating change has, as its shadow partner, accelerating obsolescence. Robert Oppenheimer, the noted physicist, once eloquently remarked:

"One thing that is new is the prevalence of newness, the changing scale and scope of change itself, so that the world alters as we walk in it, so that the years of a man's life measure not some small growth or rearrangement or moderation of what he learned in childhood, but a great upheaval."

The same theme, put in much more dramatic and provocative terms, was set out in the following terms by Don Fabun in his stimulating book on *The Dynamics of Change*:

"At exactly 5:13 a.m., the 18th of April, 1906, a cow was standing somewhere between the main barn and the milking shed on the old Shafter Ranch in California, minding her own business. Suddenly, the earth shook, the skies trembled, and when it was all over, there was nothing showing of the cow above the ground but a bit of her tail sticking up. For the student of change, the Shafter cow is a sort of symbol of our times. She stood quietly enough, thinking such gentle thoughts as cows are likely to have, while huge forces outside her ken built up all around her and, within a minute, discharged all at once in a great movement that changed the configuration of the earth, and destroyed a city,



and swallowed her up.... If we do not learn to understand and guide the great forces of change at work in our world today, we may find ourselves like the Shafter cow, swallowed up by vast upheavals in our way of life -- quite early some morning."

For those of you who are now completing your education and entering the fearsome world of change and choice, the opportunities which your education has opened for you are greater than ever before, but the challenges and problems which you will be confronting are also greater. Moreover, today you are not tying up the ribbons on a package containing a "lifetime supply of learning" acquired in less than two decades of formal education. You are merely passing a milestone -- of course, an important and highly satisfying milestone -- in a "lifetime process of learning". For in the field of knowledge, no less than any other, accelerating change is accompanied by accelerating obsolescence. In fact, it has been estimated that intellectual capital now depreciates about as rapidly as an automobile, so that a continuing process of self-renewal is imperative. Cicero once said, about a friend, "He remained the same but the same was no longer fitting."

Notes for Address by Arthur J. R. Smith,
Chairman, Economic Council of Canada
to Toronto Stock Exchange Conference on Economic Growth
May 27, 1970

THE GOAL OF ECONOMIC GROWTH

I very much welcome this opportunity to play a part in the proceedings of this Conference on Economic Growth. The subject of economic growth is a particularly appropriate topic for discussion at this time, for several reasons.

- First, we are now in a period of slowing growth in the North American economy. This is resulting in increased concentration of attention on current problems and policy issues, raising more questions and uncertainties about the future, and making it more difficult to maintain perspective on medium- and longer-term growth prospects.
- Second, this Conference is being held at a time of greatly increased interest in the causes and consequences of economic growth, in its benefits and its costs, and in the adequacy of existing information, analysis, and policies relating to the growth and progress of our society. Those who have had the responsibility for organizing this Conference deserve commendation for having developed a program which can help to illuminate these issues.
- Third, this Conference on Economic Growth is important because we are now in a period in which the question, "Growth for What?" has become a matter of pressing importance -- How will we use our growing productive

resources to meet the advancing needs and aspirations of Canadians? With wants and aspirations in the 1970's which will continue to run well ahead of our economic capacity to satisfy, how will choices be made among competing claims on available resources? On what basis will priorities be established? What are the national goals and objectives to which the productive energies and resources of our society need to be directed?

These are central questions which are now very much at the forefront of public concern in this country.

-- And finally, this Conference is timely and important because we are now coming into a period in which economic growth is coming under increasing attack because of what economists have called the "negative externalities" associated with it -- air and water pollution, urban congestion and alienation, uglification of the countryside and general environmental deterioration. Concern about these problems is rising strongly among all those who are concerned about the future of humanity. But it is vitally important to recognize that appropriate solutions to such problems do not lie in the direction of slowing down economic growth. If we hope to cope effectively with the problems of "negative externalities", we will require *increasingly good growth performance*. Successful efforts to deal with them will be expensive and will require larger resources for these purposes. But, in addition to good growth performance, we will also need highly

effective regulatory and control measures, with vigorous monitoring and enforcement procedures. In other words, it is essential to ensure that economic growth does not take place in an uncontrollable and irresponsible manner.

My task today, as I understand it, is to set out a few themes designed to provide a basic framework for the discussion of economic growth at this Conference. In attempting to do this, I propose to divide my remarks into five parts dealing, respectively, with:

- the goal of economic growth;
- the record of economic growth in Canada;
- the need for a better understanding of the sources and processes of economic growth in Canada;
- perspective on current growth performance; and
- government and private growth policies.

The Goal of Economic Growth

The goal of economic growth -- that is, the attainment of reasonably full and increasingly efficient use of scarce productive resources -- is not a new concern of economics. Indeed, almost two centuries ago, Adam Smith's famous book, *The Wealth of Nations*, was mainly concerned with the subject of growth. Its analysis of factors affecting growth, and its policy conclusions about growth still make remarkably refreshing reading today. But subsequently, economists became increasingly interested in many



other subjects, including many which were essentially viewed within the framework of what might be termed "equilibrium economics", in which many of the dynamic forces that are an integral part of growth processes were either assumed away or treated only rather peripherally.

During the past quarter century, however, "growth economics" has emerged strongly again. Moreover, the goal of rapid and sustained economic growth has become an important goal of most societies -- a goal which motivates and influences a wide variety of policies and decisions, both government and private. This renewal of interest in growth had its roots in the Great Depression of the 1930's. That Depression, with its massive unemployment and increased poverty and misery, was a searing experience that demonstrated that modern economies are not self-regulating mechanisms which can be expected to advance more or less steadily, automatically creating employment opportunities and advancing real incomes. And as soon as the overriding pre-occupations with war permitted, dedicated and forward-looking initiatives were launched in the late stages of the Second World War and in the early postwar years to create new national and international commitments, policies and institutions aimed especially at preventing a return to prewar economic stagnation -- at providing an assured basis for facilitating strong and steadier growth at high employment. These goals were embodied, in Canada, in the 1945 White Paper on Employment and Income -- and, in the United States, in the Employment Act of 1946.

Again, when a major slowdown in economic growth occurred in the late 1950's and early 1960's -- with high unemployment, underutilized productive capacity, falling investment, and a virtual halt to increases in the real average living standards of Canadians -- mounting concern developed about how to get the economy moving forward satisfactorily again. Indeed, the establishment of the Economic Council of Canada in 1963 was, in part, directly attributable to an increasingly widespread belief that a new institution was needed to advise and recommend how sustained and balanced economic growth could be restored and maintained in future. In the United States too, during this period, concern had been aroused over the high levels of unemployment and economic slack which had emerged, and also over the fact that the rate of economic growth in the United States appeared to be lagging well behind that of many other industrial nations. One of the major commitments of the Kennedy Administration on taking office in 1960 was to devise means to get the country moving again, to speed up the rate of economic growth and to reduce unemployment.

Since the end of the Second World War, the goal of high and sustained economic growth is not one which has been the exclusive concern of countries already high on the scale of income and development. Large efforts have also been made to promote and create self-generating growth in the underdeveloped areas of the world.

Why is a high value placed on this goal of attaining and sustaining strong growth? There are two basic reasons. One is that in spite of the many virtues that may be claimed for having



a society largely composed of "leisure masses", and in the face of the fact that most concepts of heaven have as their main characteristic that one does not have to work there, here on earth modern man generally appears to be a creature of work. Unemployment is not widely regarded as a happy condition; and massive unemployment is generally viewed as a major problem. In Canada's circumstances, with rapid growth in the numbers of people of labour-force age, strong and sustained economic growth is essential to maintain high employment, and to prevent the emergence of large-scale unemployment. The second basic reason why growth is valued is that it constitutes what is, in effect, a "national dividend". And this national dividend is the basis for rising material standards of living for individuals, as well as growing resources that can be devoted to social, cultural and community purposes.

We live in an age of "rising expectations", and the people of Canada have come to expect much from their economy. They not only expect the kind of economic and social progress which will maintain high employment and generate rapidly rising standards of living in a material way; they also expect the economy to provide growing resources for dealing with social problems and for improving the quality of life. They expect to have rapid gains in real incomes, and to have these along with a wider choice of job opportunities, improved working conditions, more leisure, greater security from economic hardships, and more adequate assistance in adjusting to rapidly changing conditions.

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They expect *steady* advances in real income and wealth, and an avoidance of the setbacks and inequities which in the past have arisen from inflations and prolonged recessions. And they expect that all Canadians should share in the country's social and economic progress. In other words, such progress is not judged to be satisfactory if various segments of the population or regions of the country are left out of the mainstream of the nation's overall growth and development.

This brings me to the first of three crucially important issues which need to be kept in mind in considering the goal of economic growth. It is that a high rate of economic growth is only one of several basic *performance goals*. It should not be given *overriding* importance in the quest for achieving and maintaining high standards of *performance* in an economic system. To be satisfactory, growth must not only have *quantitative* but also *qualitative* performance dimensions. Policies that propel an economy towards a very high rate of overall growth, with little or no attention to the implications for other aspects of an economy's performance -- for example, price and cost changes or its international position -- are not likely to be sustainable for long. What is, in fact, required is the simultaneous achievement of a constellation of performance goals. For Canada, these have been set out in the Economic Council's terms of reference, and include not only high growth and high employment, but also reasonable price stability, balance-of-payments viability, and wide participation by all groups and regions in the growth of the country as a whole.



A second important issue is that economic growth -- and, for that matter, all of these performance goals -- are not ends in themselves. They are means to other, more basic, ends. In the Economic Council's *Third Annual Review*, this matter was put in the following terms:

"The long-term record of the growth of material wealth in today's high-income countries has been impressive. But this growth does not proceed without social costs, and it has been tending to throw into sharper focus a growing array of problems and needs relating both to the quality of life and to an appropriate sharing in the fruits of economic progress. Illustrative of the issues which have become the subject of increasing social concern are: the problems of poverty in the midst of affluence; the needs for better access to high standards of health care and to opportunities for maximum educational advancement for all individuals in the society; increased air and water pollution in an age of greatly advanced scientific capabilities for dealing with these problems; increased urban congestion and blight concentrated especially in centres of the highest average income and wealth; and the greatly increased needs for recreational facilities and enlarged cultural opportunities in conditions of reduced working time and increased leisure. In these and other fields, there has emerged an increasing awareness that under conditions of high income and well-sustained economic growth, there are both needs and opportunities for devoting proportionately greater resources to the maintenance and improvement of the quality of life. More generally, there has also emerged a strong conviction that economic growth and development cannot be regarded as satisfactory if the rising output and income which it generates is not widely shared among all groups and parts of a country. A more equitable distribution of rising opportunities, income and wealth has thus become a more prominent objective of modern industrial economies along with other basic economic and social goals."

These and other related matters have come much more to the fore in public discussion since these words were written almost four years ago.

A third important, and closely related, growth issue is that our measurements of growth are deficient in many respects. For example, many of the elements in measured national output and income, productivity and per capita real living standards are estimated, in our present state of statistical information and knowledge, in ways that are not fully adequate. More important, these measures fail to reflect the fact that human welfare and satisfactions are significantly reduced by the effects of technological changes and other developments associated with increasingly rapid industrialization in our growth-oriented and increasingly-urbanized society. Environmental pollution, for example, has recently been coming under increasing public scrutiny and is generating widespread concern as one of the most serious "costs" of economic growth. Such "costs" are not taken into account in our conventional measurements of economic growth. There is no reduction in Gross National Product, for example, to reflect the fact that many of our rivers and lakes are no longer fit for swimming or for fishing, and that our drinking water is contaminated with chemical and biological wastes. On the other hand, the installation of pollution abatement equipment, which does no more than preserve the status quo, is counted as an addition to GNP, and hence to economic growth, under present conventions of measurement. Or, to take another example, no subtraction is made from Gross National Product to allow for rising rates of crime and violence, but the extra police forces required to cope with such problems, along with the increased costs of the judicial and penal systems, are counted as additions to GNP.



It is important to remember, of course, that our measures of growth are, in varying ways, deficient on the other side, too -- that is, on the side of understating the benefits of economic growth. Here again, science and technology have introduced improvements in the qualities and the performance of various products that are not, and perhaps cannot be, fully captured in our measurements of growing output. Similarly, growing leisure is not recorded as a positive factor in growth measures. Perhaps even more important, such measures undoubtedly tend to understate the progress in our society in such important fields as education and health, and fail to take any account of the widening of choices for individuals -- wider choices not only in the goods and services available to them, but also in occupations and in the locations in which they wish to live and work. We must therefore be careful not to take a one-sided view of the deficiencies in our growth measurements.

We are now at a stage in our evolution where we need to develop "social indicators" which will at least supplement our traditional economic indicators, and allow us to measure the health of our society in more adequate ways in the future. This is one of the most challenging tasks to which we should be addressing ourselves in the 1970's.

Perhaps I have spent too much time on some of these more general aspects of the growth goal. But it seems to me that all of these points are germane to the discussions which will be

taking place over the next two days. Let me turn now to some brief comments on Canada's growth performance over the past few decades.

The Record of Economic Growth in Canada

Let me begin with a brief comment on population growth. At the time of the 1851 Census, Canada's population was almost $2\frac{1}{2}$ million. Over the next 50 years, it grew at an annual rate of about $1\frac{1}{2}$ per cent, to reach almost $5\frac{1}{2}$ million at the beginning of this century. The rate of population growth rose over the next 50 years, to almost 2 per cent per annum, and, by 1951, the total population had reached 14 million. Over the next 18 years, from 1951 to 1969, the rate of population growth moved up further to not far short of $2\frac{1}{2}$ per cent per annum. Within this period, however, there was a sharp difference in trends: in the 1950-59 decade, the population growth rate was close to 3 per cent, but in the 1960-69 decade, it dropped back to less than 2 per cent, about in line with the average rate over the first half of this century.

Over the past century, Canada has been one of the world's high growth countries. The volume of total output has grown at an average annual rate of about $3\frac{1}{2}$ per cent per year. Only two countries appear to have grown more rapidly -- Japan and the United States. At the same time, Canada has had a much faster rate of growth of population over the past century than both of these -- indeed, faster than almost any other industrial country. Thus real income per capita -- which is often used as a rough measure

of the average standard of living -- also increased somewhat less rapidly over the past 100 years in Canada than in both Japan and the United States, although at a rate still well above that of most other industrially advanced countries.

Over the past quarter century in Canada, the rate of growth of total real output (that is, output measured in constant dollars to eliminate price inflation) has been well above the long-term average -- in fact, in excess of 5 per cent a year. This is partly attributable to faster growth in employment -- at about $2\frac{1}{2}$ per cent per year, compared with only about $1\frac{1}{2}$ per cent per year over the preceding three decades. In addition, productivity -- measured in terms of output per employed person -- has also risen from about 2 per cent to over $2\frac{1}{2}$ per cent a year.

The exceptional growth in GNP per employed person in the last two decades has brought unprecedented advances in *per capita* output, particularly during the past decade, when employment growth has been more rapid than population growth. GNP per capita grew at an average annual rate of less than 2 per cent from the late 1920's to the late 1940's, but then rose to about 2.5 per cent in the 1950's, and to over 3 per cent during the 1960's. Thus we have enjoyed not only higher and higher levels of output per capita as the century has progressed but a stepped-up rate of improvement. Real GNP per capita is now almost triple the level of the late 1920's and close to double the level of the early postwar period.

But impressive as the growth performance in Canada has been over the postwar period, the fact is that most other industrial nations have been growing faster than we have in this period. Especially in terms of real output per employed person and per capita, Canada has been a relatively slow growth country in international comparative terms. The United States has also had a relatively slow growth economy in these terms. We do not fully understand the reasons for these disparities in postwar growth rates. What is clear, however, is that if the trends of the past two decades were to continue for another decade or two, there would be quite a number of countries moving to higher *levels* of productivity and average living standards than would prevail in Canada -- and some could be approaching, or even moving above the levels of the United States well before the end of this century.

Before leaving this sketch of the record of economic growth in Canada, let us touch briefly on another important aspect of this record. One of the hallmarks of economic growth is *change*, and in this connection there have been marked changes in the structure of the Canadian economy over the past several decades. For example, around the turn of the century, roughly 40 per cent of the Canadian labour force was engaged in agriculture. But by 1946, only 25 per cent of total employment was in agriculture, and now this proportion is only about 7 per cent. On the other hand, employment in most service industries has been growing with striking speed and vigour. Twenty years ago, about two out of every five Canadians were employed in the service industries -- transportation, finance, health, education, retail and wholesale trade, public administration, and so forth. Today, about three

our of every five Canadians are employed in these industries. What has, in fact, occurred -- more slowly over the longer run, and more rapidly under the conditions of accelerated growth in the 1950's and 1960's -- is a vast shift in the structure of our economy, a shift closely associated with swiftly rising urbanization, the increased role of government, and widening choices available to individuals.

What produces economic growth? The Economic Council has been concerned ever since it was established with developing a better understanding of the sources of economic growth in Canada, as a basis for improved economic policies. Various Annual Reviews and staff and special studies have attempted to enlarge our understanding about the factors which have contributed to Canada's growth in the postwar period. It is of course evident from this work that a large part of the growth in the total volume of production has come from increases in the sheer physical *quantity* of resources used -- from increases in the number of people and the volume of capital employed. For example, over the period 1950-67 about 60 per cent of the overall growth rate of over 5 per cent per year was attributable to increases in the physical quantity of labour and capital employed. But some positive contributions to growth have also been made by various qualitative improvements in our productive resources -- such as higher levels of education and skills in the labour force and technologically more advanced capital equipment. In addition, there have been

significant increases in the *efficiency* with which these resources have been used -- for example, through shifts of men and capital from less-productive to more-productive lines of activity, and through economies of scale and specialization. I would like to take a few minutes to talk about these *quality* and *efficiency* factors and their significance for policies and strategies to promote good growth performance.

It has long been known that *education* is an important factor in the growth process, and that higher levels of income, productivity, and working skills are, around the world, closely correlated with the educational attainments of employed manpower. There has of course been a substantial long-term rise in the educational attainments of the Canadian labour force. But the average level of such attainments has been considerably below that of the United States, and has increased more slowly. There has thus been a widening "educational gap" between the two countries extending over half a century or more. On the basis of the great efforts made in the 1960's in Canada to enhance the education and skills of Canadians, we are now in a period in which improved quality of the labour force in these terms will be becoming a more important factor in growth, although much of the "payoff" from such investment in our human resources will be derived over a long period in the future. Also, the gap with the United States is probably no longer widening, and may even begin to close gradually.

Improvements in the *quality of capital equipment*, embodying the most modern design and the latest scientific and technological advances, also contribute to the growth process. Increases in efficiency and in the performance characteristics of equipment are constantly taking place across a wide spectrum of industry. One sees it in the cost reduction per passenger mile in air transportation, in the increased reliability, durability and performance of modern communications equipment, in the semi-automated factory, in new processes and techniques of production, and in a host of other ways. Indeed, it has been argued that the maintenance of strong economic growth is a process that partly helps to feed itself, for strong growth generates the need for new plant and equipment, and the more rapidly the latter grows, the larger becomes the proportion of the total stock of capital representing the most modern, advanced equipment. There is thus a virtuous circle brought into play here, in which faster growth supports and encourages the upgrading of capital stock and, hence, promotes even greater efficiencies in the production process.

The *shift of resources* from low- to high-productivity sectors is another important channel through which economic growth takes place. Perhaps the most striking example of this phenomenon is the large shift of manpower out of agriculture and into other sectors of the economy which, as I have already mentioned, has occurred in the past two decades. This shift has brought about a "saving" in the use of human resources of close to 20 per cent

of our working force, and has permitted these resources to be employed in other, higher productivity sectors of the economy where the demands and needs of Canadians for goods and services have been growing rapidly.

Economies of scale and specialization are a further significant element contributing to efficiencies in the production process. Studies by the Economic Council have indicated that one of the major factors accounting for lower levels of productivity in Canada compared with those of the United States is the more limited degree of scale and specialization in this country. But the Canadian market is growing at a rapid rate, and our export markets in recent years have grown even more rapidly, especially in some of the technology-intensive manufacturing industries. Our studies of the sources of economic growth have indicated that increased economies of scale and specialization have accounted for a significant part of the growth rate in Canada in the postwar period.

The sources of growth which I have touched on here cover most of the major "quality" and "efficiency" factors in the growth process, but not all of them. A full list would have to include the general advances in managerial and organizational knowledge which permit people "to work smarter", to use Peter Drucker's phrase. Changes in managerial and organizational systems may be as important in promoting good growth performance as any of the other factors which I have mentioned -- indeed, perhaps more so.

Taking the Western World as a whole, comparative growth studies suggest that somewhere between two-fifths and three-quarters of all economic growth results from quality and efficiency factors, such as those which I have just discussed -- that is, from sources other than the sheer growth in the physical quantities of labour, capital and other productive "inputs". The Economic Council has already published a study setting out some of these growth elements in an international perspective, and we will shortly be publishing a revised and more up-to-date set of comparisons.

Up until now, the Council's appraisal of growth has been largely concerned with the overall growth of the national economy. This has provided a broad framework for perspective and analysis. But for all of the many insights which such an approach provides, the use of national averages and aggregates masks many of the important features of the growth taking place in the Canadian economy. To understand the processes of growth more clearly, it is necessary to probe more carefully beneath these national totals and averages, to disaggregate them, and to look at the patterns which emerge among the individual economic sectors and industries. This is a task which stands high on the agenda of the future work of the Council, and on which it will be reporting in at least a preliminary and partial way in its *Seventh Annual Review* later this year.

Perspective on Canada's Current Growth Performance

Economic growth is a complex long-run process. Too frequently, growth and productivity performance is discussed and analysed in a framework that is too short for proper perspective. In the present circumstances of less than satisfactory performance in our economy in a number of respects, it is very important that an appropriate longer-term perspective be maintained about growth.

The proper place to start is not with *actual* growth, but with the economy's *potential* growth. We are now, in fact, in a period of very large growth potentialities in Canada. Fundamental to this is that the labour force age groups are expanding very rapidly, much more rapidly than those in any other industrial country -- half again as rapidly as in the United States and several times as rapidly as in most European countries. We therefore have a very large potential and need for employment growth. We also need, and can undoubtedly generate, a large potential growth in capital. Taking these factors, together with reasonable calculations of the potential medium-term growth in factor productivity, it can be estimated that the potential rate of growth of output is around 5 per cent for the 1970's -- perhaps a little higher in the first half of the decade and closer to 5 per cent in the second half. It is against this yardstick that actual growth in the economy should be assessed.

What has recently happened in Canada, beginning in 1967, is that actual output has advanced, on average, slightly less rapidly than potential output, so that a moderate amount of economic slack has emerged. This is largely the result of policies of monetary

and fiscal restraint -- policies aimed at moderating the unacceptably high rate of increase in prices and costs that have been a source of greatly increased concern during the past few years. These demand management policies have recently been operated at highly restrictive settings -- and, on the basis of various measures, appear to constitute, in combination, perhaps the most restraining posture of such economic policies in Canada since at least the early postwar years. Although these policies are mainly aimed at constraining demand, they also tend to constrain output. As this happens, productivity growth is frequently retarded, as has been the case in both Canada and the United States during the past year.

Reduced productivity growth has been one element in the emerging economic slack. Other, and perhaps more conspicuous, elements have been the slower growth of employment, higher unemployment, a slower growth in the labour force (reflecting declining participation rates, especially among younger people), and a substantial rise in part-time employment. With production slowdown or cut-backs -- like those which have already emerged in housing and some consumer durables, and which are now emerging for some nondurables -- more part-time use of capital also occurs.

A few brief comments may help to put these developments into perspective. First, the present degree of slack in the Canadian economy, though rising, is perhaps only about half of that which we were experiencing in 1960-61. At the same time, we have significantly more slack than exists in the United States economy, which is only just being brought into more reasonable alignment with its potential growth rate, after a number of years of clearly excessive demand pressures tending to force actual output above potential output during most of the latter part of the 1960's.

Second, it is important for several vital reasons to prevent the emergence of substantial slack. It not only imposes great hardships and burdens upon many people -- and especially upon the disadvantaged who are most exposed to the risks of unemployment and reduced incomes -- it also imposes large costs on our whole society. It creates imbalances and distortions which cannot be easily set right, as was demonstrated in the first half of the 1960's, when it took a number of years to restore reasonably high levels of employment, and when a major capital spending boom became inevitable to make up for previous cut-backs. In other words, when actual output falls substantially below a rapidly rising trend of potential output, two growing dangers emerge. One is that it may become very difficult to restore growth momentum to an economy. The other is that such a situation encourages strong pressures for sudden and inappropriately large shifts to expansionary policies. Thus, when growth momentum does re-emerge, the economy may tend to spring forward into a major new boom leading to a new round of some of the serious problems with which we have been seeking to wrestle in the latter part of the 1960's.

We obviously still have large unresolved difficulties in developing a total framework of economic policies of many different kinds, that would help to reconcile conflicting forces and tendencies in our economic system, and promote more consistent progress towards all of our complex economic performance goals *simultaneously*. What makes such progress particularly difficult is the interdependence of the Canadian economy with that of the United States and the rest of the world, and the existence of substantial lags between policy

changes and their major economic effects. Furthermore, so long as inflation still has considerable momentum, the maintenance of a moderate degree of economic slack is probably needed to help to restore reasonable price stability. Having regard to our present circumstances and problems, however, I believe that policies should be aimed at steering the economy forward over the next year or two at a rate which would avoid a further building up of slack. A national commitment to such a "growth strategy" for Canada would imply an early resumption of real growth at an annual rate of about 5 per cent. To say that we should aim at such a strategy is far from saying that it can be easily or quickly achieved. But such an aim appears vitally important if we wish to attain consistently better *overall* performance in the medium-term future.

Growth Policies

Let me now turn to a wider range of policy issues concerning growth, including some relating to private decisions as well as to government policies. It is sometimes assumed that achieving and maintaining high standards of performance in our economy, including a good growth performance, is essentially the responsibility of governments -- sometimes even more narrowly assumed to be the responsibility of the federal government alone. Nothing could be further from reality. Although governments today -- federal, provincial and municipal -- obviously play a larger and more influential role in the economy than in the past, the fact is that we have a very highly decentralized system of economic decision-making in Canada -- a system in which the great bulk of the decisions affecting the economy are actually made outside of government.

Thus, with regard to the demand policies required for good growth performance, the major government demand management policies -- monetary and fiscal policies -- are by no means the only ones which are relevant. For example, business firms should seek to develop investment programs which, in their own interests, would extend over time horizons of several years in order to achieve a smoother and steadier course of expansion and to avoid the "bunching up" of business investment outlays such as occurred in 1963-66.

On the supply side, too, there are major tasks for both governments and private decision-makers -- especially in improving both the quality of productive resources and the efficiency with which such resources are used.

In the field of manpower, for example, there are major roles for both. On the one hand, there are policies that help to promote a fuller use of available manpower -- policies that help to keep unemployment and underemployment relatively low; policies that encourage increased participation in the labour force, and policies and practices that prevent discrimination and assist the disadvantaged to find and hold remunerative jobs. On the other hand, there are policies to promote improvements in the quality of our manpower resources.

In the 1960's, largely at the initiative of government, Canada's formal educational system has been vastly expanded and extensively changed to produce a greatly increased flow of better educated manpower. Similarly, governments have taken a variety of steps to introduce manpower programs. On the one hand, these have involved training and retraining to develop and upgrade skills.

On the other hand, they have provided mobility allowances and information and counselling services in order to bring about a more efficient matching of demand and supply in labour markets. Private organizations and associations, and community institutions such as hospitals, also have very important roles to play in manpower development -- ranging all the way from on-the-job skill training, through special courses designed to improve technical knowledge and capabilities, to management development.

As regards capital, a wide variety of decisions, both government and private, have a bearing on the complex savings-investment processes in a modern economy, affecting the levels of savings, the allocation of capital to different parts of an economy, the trend of growth in capital per employed person, and the effectiveness with which capital is used. In general, while there is growing evidence to suggest that capital does not appear to be the *dominating* source of economic growth which it was once believed to be, it nevertheless still appears to be an important contributing factor. Thus the efficient accumulation of capital, adequate access to capital, the cost of capital in a broad sense, and well-functioning capital markets which help to make capital flow to users who can make highly effective use of it, are all important matters to which both government policies and private policies should be addressed.

Improvement in the quality of capital is also a vital matter. Moreover, this merges into the larger issue of the role of science and technology. There has been a growing recognition in the 1960's that technological advance, broadly conceived, is a significant factor in economic growth. In government, greatly increased attention has been given to this matter over the past

decade, and a wide variety of programs and actions have been implemented to strengthen the nation's scientific and technological capabilities. The emphasis which has been emerging within the last two or three years on *innovation* is particularly important, for this is the bridge which spans the gap between the *creation* of new knowledge (an activity which has little direct effect on growth) and the *application* of both existing and new knowledge in production processes and in markets (an activity which may have major relevance to growth). But in this field, the critical decisions are private rather than government. The role of the latter is essentially that of providing favourable conditions to facilitate appropriate technological and innovative advances. The actual exploitation of opportunities remains essentially a matter of private capabilities and actions. In this context, the role of management is vitally important; and the development of high quality managerial talent and managerial training is a key requirement for a modern, rapidly-growing economy.

In addition to the policies that help to support and sustain growth by enlarging the quantities and improving the qualities of labour and capital resources, there are also a wide range of important growth policies that can help to promote *increased efficiency of use of productive resources*. First, let me touch briefly on a few broad categories of government policies:

- *commercial policy* used effectively both to maintain competitive pressures on Canadian industry and to open up better access to external markets and thereby enlarge the scope for more scale and specialization;
- *competition policy* (in the field of monopoly, mergers, business agreements and other practices) judiciously harnessed, as was recommended in last year's Economic Council report on this subject, to the central objective of promoting efficient use of resources in the Canadian economy;
- *adjustment policy* aimed at encouraging flexible adaptation to technological and other change, minimizing undue burdens on individuals in accommodating to such change, encouraging mobility of manpower and capital resources from lower-productivity to higher-productivity uses, and stimulating entrepreneurial and innovative activity in response to new opportunities both in Canada and abroad;
- *regional policy* directed particularly at promoting faster productivity growth in the lower-income regions;
- *anti-poverty policy*, including among its principal elements, programs to create income-earning capacities and opportunities among the large numbers of poor who have faced great difficulties in finding and holding steady and increasingly rewarding jobs;

- *tax and expenditure policies* which have wide and varying effects on the capacities of both governments and private organizations to use scarce productive resources effectively; and
- *information, research, planning and evaluation policies*, without which, any efforts to promote more efficient use of resources would represent little more than blind groping in the dark.

Underlying all of these are *stabilization, balance-of-payment and other policies* which have a key role to play in promoting *balanced* growth -- that is, in steering the economy along a relatively smooth growth path -- for increasingly efficient use of resources is made more difficult to achieve in circumstances of economic instability.

In the private arena, too many areas of decision-making are of great importance as regards the achievement of more efficient use of labour and capital -- for example:

- aggressive export marketing;
- strong competition with domestic and foreign rivals in internal markets;
- good labour-management understanding about the need for -- and, wherever possible, jointly agreed procedures for facilitating -- flexible adjustments to technical and other change in industry;
- the critical need for seeking out and implementing "best practices" already in use, not merely in other organizations in Canada, but also abroad;
- harnessing the development of new activities to high demand growth possibilities for the future;

- wider, more sophisticated and more innovative industrial planning and evaluation activities, cover a growing range of investment, manpower, marketing, technological, financial and other activities;
- discovery and support of entrepreneurial talent, which is very scarce; and
- certain matters which I have mentioned earlier, such as improved managerial capacities and efficiently operating financial markets.

In the last analysis, the productivity growth of the nation as a whole is very largely the result of productivity growth taking place within many tens of thousands of individual organizations, mostly private organizations. One of the most encouraging phenomena in Canada over the past decade has been the emergence of more explicit and knowledgeable interest in productivity within individual organizations. By focusing attention on the relevant issues, this Conference could well help to strengthen this interest further.

More generally, this Conference can help to set the stage for viewing our growth goals and problems for the 1970's in better perspective, by focusing attention on the larger issues involved -- the need to strive for qualitative and not merely quantitative dimensions of growth; the essential need for regarding growth as a means to ends and not as an end in itself; the importance of viewing growth as only one of a number of important, and not always easily compatible, goals of modern society; and both the predicaments and the promises inherent in Canada's very large economic growth potentials for the 1970's.

Notes for Remarks by
Arthur J. R. Smith, Chairman,
Economic Council of Canada,
to the Board of Trade,
Toronto, March 2, 1970

CANADA'S TRADE POTENTIALS FOR THE 1970'S

During the 1960's, Canada has experienced a towering expansion in its international trade -- an expansion of unexpected and unprecedented dimensions. This evening, I would like to focus attention on Canada's trade potentials for the 1970's.

Any assessment of these potentials should properly begin with consideration of four basic questions. First, what are Canada's over-all economic growth potentials for the 1970's? Second, what are the growth possibilities among our principal international trading partners? Third, what can we learn from our trading experience in the 1960's that is relevant to the 1970's? And fourth, what prospective problems and developments may have a significant bearing on our trade potentials over the coming decade? Let us take up each of these questions in turn.

Canada's Economic Potentials in the 1970's

We are now in a period of extraordinarily large growth potentials for the Canadian economy. These possibilities can be placed in perspective by four estimates.

First, the volume of total Canadian output in 1980 could, even on rather conservative underlying assumptions, be almost as much above that of 1967 as the 1967 level was above that of 1867 -- in other words, we are now in a period in which within the space of 13 years, the economy's potential

capacity to produce goods and services could expand as much as over the whole first century of Canada's history as a nation.

Second, in the coming decade -- from 1970 to 1980 -- the annual volume of output could rise by an amount which is not far short of twice the increase which occurred in the 1960's -- or by an amount roughly equivalent to that which has taken place over the past three decades (from 1940 to 1970).

Third, the cumulated total of all goods and services which could be produced and made available to Canadians over the 1970's could amount to over a trillion dollars (measured in constant 1970 dollars). This estimate assumes, however, that the economy's actual growth path during the coming decade can be kept reasonably close to its potential growth path -- that is, that substantial or prolonged economic slack can be avoided. This would be roughly equivalent to the total flow of goods and services produced in Canada from the end of the Second World War to date.

Fourth, the average annual rate of increase in the economy's potential capacity to produce goods and services over the coming decade could be at least 5 per cent -- somewhat higher than this in the first half of the 1970's, and perhaps around 5 per cent in the second half. This is about the same as the rate of growth actually achieved by the economy in the 1960's. It is well above the longer-term historical growth rate of the Canadian economy, and also above the potential growth rate of the United States, as well as those of most other industrially advanced countries over the medium-term future (with the important exception of Japan).

In setting out these estimates, I have been careful, as you may have recognized, to stress repeatedly such words as "potential" and "could". It would be a serious mistake to leave the impression that these great growth possibilities of the 1970's will automatically or necessarily become realities. Whether they can be turned into realities will depend on a host of complex factors. Many of these will be largely beyond our capacity to influence. In particular, our future opportunities for achieving and sustaining high growth will be substantially shaped by external economic and other forces over which we can have little or no control. But even if international conditions are generally favourable, such opportunities will also be greatly influenced by the way in which we manage our own affairs in Canada -- not only in the field of economic policies and decision-making, but also in the social, scientific, political and human fields. Above all, much will depend on whether we make economic growth one of the central goals of our society -- one of the goals which is consistently kept in mind when major policies and decisions are formulated and implemented.

In suggesting that economic growth should be a goal to which we, as Canadians, should make a consistent national commitment, I do not mean to imply that this is a goal which should be given overriding importance. Indeed, it is not a goal which should be put on a pedestal above other goals; nor is it one which is valuable for its own sake. The growth performance of an economy cannot be adequately judged by the single criterion of the rate of growth achieved. It will only be satisfactory -- indeed, it can only be sustained -- if it goes hand in hand with high employment, reasonable price stability, balance of payments viability and a broad sharing of the growing volume of goods and services which it generates. Moreover, economic growth -- even if it is high, stable, and widely-shared -- is not an end in itself. It

is merely a means for achieving other more basic purposes. In the last analysis, what is important about attaining a good growth performance is not rapidly advancing production and productivity, but the rising flow of goods and services which such advances make available for satisfying human wants and aspirations. Man, of course, has many aims and aspirations -- including many of his most cherished and ennobling desires -- that require few, if any, economic resources to satisfy. But the simple fact is that even in countries which have already achieved considerable affluence as a result of past economic growth, people have a large and growing array of wants and needs -- not only for themselves and their families, but also for the community and society in which they live -- which can only be met by increasing the availability of goods and services at their command.

In this context, Canada's large growth potentials in the 1970's should properly be viewed as providing a greatly expanded capacity for Canadians to satisfy what the Economic Council has called "achievement goals", such as "more personal consumption, improved health care, better education, more adequate housing, reduced regional disparities, the elimination of poverty, aid to underdeveloped countries, peace and international stability, improved transportation (especially in our cities), pollution abatement, beautification of our cities and a higher quality of urban life, encouragement of the arts, the creation of new knowledge, resource conservation, to mention only a few".^{1/}

Canada's trade potentials for the 1970's must therefore be viewed against the background of very large growth potentials for Canada. If we come

^{1/} Sixth Annual Review, p. 171.

reasonably close to achieving these domestic potentials, we will have very large increases in production, income, investment and consumption, all of which will induce large increases in imports. At the same time, the high growth potentials -- reflecting, as they do, a large potential growth in employment and capital investment -- will also greatly expand the amount of productive capacity which we can devote to exporting. And in many ways -- both directly and indirectly -- rising exports and imports can play a vitally important role in helping us to better satisfy the wide variety of achievement goals to which we aspire.

Over the past quarter century it has typically been the case, among both industrially advanced and less developed countries, that a sustained high rate of economic growth has been associated with an even faster rate of growth in trade -- in both exports and imports. Conversely, slow domestic growth has typically been associated with relatively slow advances in trade. An example of the latter case has been the United Kingdom. Examples of the former are Japan, the countries of the European Economic Community, and such developing countries as Taiwan, Hong Kong and Singapore.

Thus, if we measure up reasonably well with our large economic potentials in the 1970's, we can expect to have a very strong growth in Canadian trade in the 1970's.

But, as I have already mentioned, the realization of strong and sustained growth in Canada will depend critically upon the actual growth of the world economy in the 1970's -- and, more particularly, upon actual growth among Canada's major trading partners, especially the United States. This brings me to my second major question. What are these external growth prospects for the 1970's?

Economic Growth Among Canada's Major Trading Partners in the 1970's

Two underlying factors suggest that at least the growth potentials in Canada's major trading partners could be relatively large for the 1970's. The first is that, although a growing range of goals are claiming increased attention and concern in these countries, there remains a firm and basic commitment to economic growth as a basic objective in most of them. Indeed, in the past decade there has generally emerged an even more explicit acceptance of the goal of growth among these countries -- witness, for example, the commitment of the O.E.C.D. countries (Europe, North America and Japan) to an explicit growth target for the 1960's, followed by the current studies going forward in O.E.C.D. to set an appropriate growth target for the 1970's. A further illustration is the remarkably clear statements in the latest Annual Report of the U.S. Council of Economic Advisers of an appropriate high-growth path for the United States in the 1970's, together with the formulation of relevant policy strategies for attaining this growth path. In this context, it might also be noted, that there is a corresponding more explicit commitment to economic growth in the lagging regions and countries of the world -- again, a commitment which has been institutionalized in another international organization (the United Nations Conference on Trade, Aid and Development).

The second set of factors underlying the external growth potentials for the 1970's is the varying combinations of strong growth elements in the United States, Europe, Japan and elsewhere. The United States, for example, will be in an extended period of high growth of the labour force and potential employment -- not at such high rates as in Canada, but still very high by historical standards in that country. Japan shows every sign of a continuing extraordinary capacity to maintain a very high rate of growth of productivity.

European countries, too, will generally have high growth potentials based on differing combinations of expanding labour and capital resources and of expanding productivity capabilities.

On the basis of appropriate policy settings, and with avoidance of serious international instabilities (both political and economic), the future therefore looks promising. Underlying the Economic Council's assessment of Canadian economic growth possibilities to the mid-1970's in its last Annual Review was an assumption that the average annual rate of real economic growth in the combined output of all O.E.C.D. countries should average about $4\frac{1}{2}$ per cent from 1967 to 1975. I would see no reason to change that assumption today. More generally, while the O.E.C.D. has not yet delineated a growth target for the 1970's, it would hardly be surprising, I believe, if such a target for the 1970's would not be set at least as high as in the 1960's -- that is, a target of at least a 50 per cent expansion in real output for the decade as a whole. To give you some idea of what the attainment of such a target would mean, I might indicate that the total output of the O.E.C.D. countries is now approaching \$2 trillion (in U.S. dollars), and that the 1970's could see an addition of another trillion dollars of output (in 1970 prices) over the next ten years. This would be equivalent to adding approximately the total size of U.S. output in 1970 to the annual flow of O.E.C.D. output by the end of the 1970's -- or, to put this another way, it would mean adding, on the average, something of the order of the current size of the Canadian economy to total O.E.C.D. output, each year in the 1970's.

If anything approaching these growth potentials were to be realized in the 1970's, the demand for Canadian exports would grow very substantially over the coming decade.

Canada's Trade Performance in the 1960's

The third basic question which I raised at the outset of my remarks related to Canada's trade experience in the 1960's and the possible relevance of some of this experience for the 1970's.

First, a few salient facts. At present, about 50 per cent of all goods produced in Canada are exported. In 1960, this figure was only about 35 per cent. Moreover, as high as 70 or 80 per cent of the output of some major industries is now being exported; and well over half of the output of goods in some regions of the country is exported. Thus, trade is of very great significance, not only to the country as a whole, but even more, to the growth and welfare of many industries and regions.

During the past 10 years, the value of Canada's exports has nearly tripled -- from about \$5 billion in 1959 to almost \$15 billion in 1969. This means that we have achieved the astoundingly high rate of over 11 per cent per year in our export growth (well above the $9\frac{1}{2}$ per cent rate recorded in the growth of world exports). Canada's share of world exports has risen from about $5\frac{1}{2}$ per cent to 6 per cent over the past decade; this means that we are now exporting about a billion dollars more than if we have merely maintained the share of world trade which we had at the beginning of the 1960's.

Also, Canadian exports have risen faster than Canadian imports. The latter grew at slightly less than a 10 per cent annual rate in the 1960's. The result has been a change of over a billion dollars in our balance of trade -- from a deficit of over \$400 million in 1959 to a surplus of \$670 million in 1969. Moreover, it might be noted that the 1969 surplus could well have been around a billion dollars if labour-management disputes during the past year had not produced significant adverse effects on Canada's export and import performance.

Two of the main features of these very large changes have been the extraordinarily rapid expansion in exports of highly manufactured Canadian products in the 1960's, and the relative rise in trade with the United States and Japan. Exports of highly manufactured products are now over 12 times the level of a decade ago, and have risen from about 8 per cent to about 38 per cent of total Canadian exports. While this enormous boom in these exports has obviously been greatly accentuated by a number of special factors -- most notably the Automobile Agreement -- a huge expansion of such exports has also been achieved, quite apart from these factors. This tremendous growth in exports of manufactures has been closely associated with increasing scale, specialization and competitiveness in many Canadian manufacturing industries, and with a faster rate of growth in manufacturing production than in the economy as a whole.

As for the geographical distribution of our trade, the United States and Japan, which accounted for slightly less than two thirds of our exports and slightly more than two thirds of our imports in 1959, now account for three quarters or more of both exports and imports. The other striking feature of the trade destination shifts in the 1960's has been the very slow growth of Canadian trade with the United Kingdom: in 1969, the proportion of Canadian trade with this latter country (both for exports and imports) has been approximately cut in half in the 1960's. Of course, the United Kingdom remains our second most important market, and one which is significant for agricultural products, and certain industrial materials. But if the trends of the 1960's were to continue through the 1970's, Canada's trade with Japan could substantially exceed its trade with the United Kingdom by 1980.

There is considerable evidence to suggest that, following the devaluation of the Canadian dollar in the early 1960's, Canadian industry has generally achieved and maintained relatively strong international competitive capabilities, and that these have contributed both to highly successful penetration of many external markets, as well as to very good performance by various import-competing industries in Canada.

Among the most important lessons of this experience in the 1960's, are the following. First, Canadian producers have demonstrated that, under appropriate conditions, they can be internationally competitive in a wide variety of products. Out of this has emerged a new sense of confidence in their ability to compete well under highly competitive and dynamically changing conditions -- a confidence which has reinforced aggressive marketing, encouraged greater attention to quality, and stimulated greater efforts to achieve rising levels of productivity and efficiency. Second, the devaluation brought a marked improvement in relative prices. Analysis undertaken at the Economic Council suggests that relative price and cost movements tend to have a major impact on trade developments. The critical lesson here is that we must keep prices and unit production costs in Canada from rising more rapidly than those occurring in our principal trading partners. Third, a combination of other underlying factors appear to have had a profound influence on our trade performance in the 1960's -- among these, increased scale, and perhaps even more important, increased specialization in Canadian manufacturing; the rising role of multinational corporations which have proved to be a powerful instrument for achieving beneficial trade growth; major forward strides in the application of more advanced technology in Canadian production, frequently most pronounced in medium- and small-sized Canadian companies rather than in large corporations, and in companies producing components rather than finished

products; and greatly improved entrepreneurial, managerial, marketing and other skills, brought more effectively to bear on business activities by younger, more enterprising and better trained and educated businessmen, operating in an environment of reduced trade barriers, more dynamic change, and widening opportunities for industrial growth. In this environment, the successful businessman has been acutely conscious of a fundamental truth frequently unrecognized by the economist -- that future opportunities do not necessarily lie where current returns are the highest.

This brings me to the fourth basic question posed at the outset of my remarks: What prospective problems and developments may have a significant bearing on our trade potentials over the coming decade?

Possible Future Influences on Canada's Trade Potentials

Many major uncertainties can be raised about the influences which could affect Canada's trade potentials and performance during the 1970's.

Let me list only a few possibilities:

- strains and difficulties in the international monetary and payments system, or in Canada's external payments balance;
- significant changes in world trading conditions as a result of adjustments in tariffs and nontariff trade barriers, both Canadian and others;
- the development and extension of existing free trading arrangements, perhaps especially the expansion of the European Economic Community to include the United Kingdom and a number of other countries;
- new trading arrangements between the more industrially advanced and the developing countries -- in particular, arrangements designed to enlarge access to the markets of the more advanced countries by low-cost producers in the low-income regions of the world;
- the rapid growth of multinational corporations (a study which will shortly be published by the Economic Council emphasizes that these corporations are everywhere growing with striking speed and vigour, and estimates that by the latter part of the 1980's they could account for as much as a third of total output in The Free World, as compared with well under a fifth in the mid-1960's);

- the potential threats that may arise to a number of Canadian industries from the growing trade capacities of the state-trading nations, especially in the field of minerals and industrial materials;
- an intensification of severe difficulties already affecting Canada's trade in agricultural products, especially grains; and
- rapid technological advances that may either quickly make obsolete many elements in existing trade, or quickly open up dynamic new trade opportunities.

But uncertainties about Canada's future trade potentials are nothing new. We have lived with these constantly throughout our history. And, in many ways, the uncertainties about the 1970's would appear to be much less formidable than those which hovered over us at the beginning of the 1960's. At that time, there was a good deal of pessimism about our trading future: advances towards freer trade looked bleak; possible U.K. entry into the European Economic Community seemed to pose very serious threats to our trade; our balance of payments problems and our international competitive capabilities were giving rise to serious concern; and our trading relations with the United States were under serious strain. In the event, many Canadian fears about the 1960's proved to be groundless, and we achieved a trade performance in the 1960's which virtually no Canadian would have believed to be possible ten years ago. Moreover, as we enter the 1970's, our basic position is incomparably stronger than it was when we entered the 1960's.

Canada's Trade Potentials for the 1970's

Thus, when we come to consider Canada's trade potentials for the 1970's we start from a strong base. Admittedly, we are now in a period -- at least in 1970 -- in which our actual trade performance is being adversely

affected by the current economic slowdown in both Canada and the United States, and the trade developments in 1970 will undoubtedly be disappointing in some quarters. But it is important to recognize that this will reflect temporary factors, and that the medium- and longer-range future is very promising for most major categories of trade.

In its Sixth Annual Review, the Economic Council attempted to assess, in more detail than ever before, some of the possible demand configurations consistent with good general performance by the Canadian economy in relation to its medium-term growth potentials. Among the highlights of this analysis were the following:

- First, that Canada's exports in 1967 to 1975 could advance at an average annual rate of over 10 per cent per year and imports at a roughly similar rate (in 1967-69, the actual rates of advance have, in fact, been well above this rate -- around 14 per cent per year for both exports and imports);
- Second, that exports of highly manufactured products in 1967-75 could advance at a rate of 16 per cent per year, and imports of such products at a rate of 13 per cent per year (actual rates in 1967-69 have been over 33 per cent per year for exports and nearly 17 per cent per year for imports); achieving these high rates would imply a steady move towards international specialization;
- Third, that Canadian exports of industrial materials -- which will remain a very large component of Canada's exports to the mid-1970's -- could rise by over 6 per cent per year from 1967 to 1975 (the actual rate in 1967-69 has been over 9 per cent, and would have been higher without prolonged strikes in the industrial materials industries in Canada in 1969);
- Fourth, that the agricultural sector will constitute a category of virtual stagnation in Canadian exports over the first half of the 1970's, especially for grains (which constitute the principal component of agricultural exports) -- even with strong marketing efforts, and significant changes to promote such trade, the Council estimated that the value of Canada's exports of grain by the mid-1970's would be little, if any, larger than in 1967; this implies major and difficult adjustments,

including the need to reduce stocks of wheat without creating problems elsewhere in agriculture, as well as adjustments of resources out of the agricultural sector of the Canadian economy; obviously required will be greatly strengthened policies to facilitate such adjustments, so that Canadian farmers and important regions of the country are not subjected to undue burdens of adjustment.

Looking beyond the mid-1970's, there is no reason to believe at this time that the latter part of the coming decade could not be a period of continuing substantial trade growth -- growth which can continue to play a vital role in the growth and development of this country. But if a high trade growth is to be realized, it will be essential to keep in mind that such performance can only be achieved on the basis of strong productivity growth in Canadian industry, along with a relatively good performance in maintaining price and cost stability in Canada, and effective policies to maintain competitiveness, technological progress, a commercial policy setting favourable to rising trade, and business decision-making which is highly sensitive to new opportunities and to flexible adaptations to change.

In any economy there will always be difficulties in keeping so many moving parts of widely differing designs, and powered by highly complex and widely differing forces, in satisfactory relation to each other. Moreover, the same difficulties will always exist in the international economy. And when growth is very rapid -- and when the actual growth performance of the Canadian economy is reasonably near potential -- all these moving parts will be moving more rapidly, thereby bringing about more rapid industrial and structural changes. Yet, it is precisely in these conditions when trade growth can be most vigorous, and when trade expansion can play its most effective role in contributing to national goals and objectives.

Today Canada's exports are running at an annual rate of about \$15 billion. Under high growth conditions, they could reach \$25 billion by 1975, and well over \$35 billion by 1980, if we can exploit future opportunities effectively. Roughly comparable growth can be anticipated under such conditions for imports -- from today's rate of somewhat less than \$15 billion to perhaps \$24 billion by 1975, and to over \$35 billion, too, by the end of the 1970's. The possibilities for a growth of more than 100 per cent in Canada's trade in the 1970's suggests great opportunities for those who are, or who can become, significantly involved in trading activities.

Throughout Canada's history, trade has been a powerful instrument in the country's growth and development. It will continue to be in the future. Canada is a young country, still striving for national and regional adaptation and development. Our position as a maturing, confident country could be profoundly affected by our trading performance.

As we enter the 1970's we appear to stand not so much at the summit of a huge trade expansion in the 1960's, as far up a great slope which can still stretch upwards steeply in the 1970's. The trade possibilities for the coming decade are, in fact, immense. How well we can exploit them, and harness them to satisfying the needs and aspirations of Canadians during the coming decade is one of the great challenges facing this country.

Notes for Address by Arthur J. R. Smith
Chairman, Economic Council of Canada
to the 50th Anniversary Conference
of the Society of Industrial Accountants
Toronto, June 17, 1970

CANADA TOWARDS THE YEAR 2000 --

THE ECONOMIC AND SOCIAL ENVIRONMENT

I am honoured to have the opportunity to speak to the members of this distinguished society at the Conference which marks the 50th anniversary of its formation. The topic chosen for this Conference, although ambitious and complex, is very much in keeping with our times, and with the growing recognition that we should be taking a longer look ahead to where we may be going in our future development as a nation. I am therefore very pleased to have been invited to participate in the Conference, and to suggest a few thoughts about how our social and economic environment may alter between now and the end of the century.

Looking ahead to the year 2000, we can, I believe, see some of the broad outlines of our society of that time. Barring major social, political or economic disruptions, Canada will have a significantly larger population, and virtually all of the growth will occur in the larger metropolitan areas. Canada will also have a substantially larger and more service-oriented economy. The shifting structure of the economy will reflect, among other things, increased concern with the solution of social problems in a broad sense. Indeed, it will be important to develop over the next 30 years a new and broader system of national accounting to provide more comprehensive measures of our social and economic progress and to serve as a basis for policies and decisions in various parts of our society.

The future cannot be delineated with accuracy and precision in its many complexities and details. Yet, some of the broader dimensions can be discerned by examining some of the major forces and factors likely to shape the evolution of our society. In fact, we have no real choice other than to make an attempt to do so. In an era of rapid technological, social and economic change, a society and its decision-makers must "monitor the future" if they are to anticipate and respond to evolving needs in a timely way, and minimize or avert developing problems before they reach crisis proportions.

The growth of interest in futurology has been striking over the last decade. Yet the techniques for examining the future are still highly imperfect, and need to be more fully developed. Much discussion of the future still appears in the form of specific predictions and projections -- all too often based on assumptions and analysis that are heavily influenced by the experience of the recent past, and also often reflecting an underlying "economic determinism" implying that culture, politics and various aspects of our way of life will be essentially determined by the prevailing economic order. I do not mean to suggest that systematic projections of demographic, economic, technological, educational and other activities within a consistent framework may not be very useful. They can be. And it is important to devote more resources and effort to further development and improvement of such work. But it is important to recognize that such projections provide only a limited framework for assessing the future.

Another technique for studying the future involves social projection. This consists of taking a few possible features of a society and showing why, in spite of their variety, they fall into a



particular pattern, and why this is the most likely pattern to assert itself. This was de Tocqueville's approach. One hundred and forty years ago, in apparent opposition to the prevailing forces in Europe at that time, he suggested that the dominant force of the future would be the trend towards social and economic equality. Peering perceptively into the long-term future in his famous work, "Democracy in America", he wrote:

"The good things and evils of life are more equally distributed in the world; great wealth tends to disappear, the number of small fortunes to increase; desires and gratifications are multiplied, but extraordinary prosperity and irremediable penury are alike unknown.... Each individual stands apart in solitary weakness; but society at large is active, provident, and powerful: the performances of private persons are insignificant, those of the state immense.... There is little energy of character, but manners are mild, and laws humane.... Human existence becomes longer and property more secure.... The ties of race, of rank and of country are relaxed.... Almost all extremes are softened or blunted: all that was once most prominent is superseded by some middle term."

Unfortunately, there are few de Tocquevilles, and it is difficult to choose those with comparable perception from among the increasing number of people engaged in the study of the future. It is clear, however, that we must improve our techniques for studying the future and for evaluating the emerging work in futurology.

De Tocqueville's trend towards greater social and economic equality is still important in our society. But new forces appear to be emerging.

Basic Trends

With respect to the dominant social patterns of the future, the term frequently employed to designate "the coming order" is one coined by Daniel Bell -- namely, the "post-industrial society".

Many complex forces are at work tending to change the world's more advanced societies in major ways. Among these, I have chosen three for special attention.

The first is a shift in the way knowledge will be derived and employed in the future. In the past, knowledge has often been derived through work in largely isolated disciplines. Increasing specialization in teaching, research, professional practice and the application of knowledge is still a powerful trend -- accompanied by many different forms of increased compartmentalization and insulation. However, in the future, there will be a greater multidisciplinary synthesis and development of knowledge. Further, the development of increasingly complex models -- models embodying growing linkages both within and between the natural and social sciences -- will gradually become more important as a basis for decisions about change and innovation.

This trend towards multidisciplinary synthesis of knowledge and a greater use of theory may result in the economy becoming increasingly engaged in education, in the production of services and amenities, and in research of all types -- particularly in relation to social questions and the interaction between society and technology. Moreover, in the future, the distance between the decision-makers and those who are responsible for the development and synthesis of knowledge may well narrow. Indeed, decision-makers may themselves become more directly involved in the synthesis of knowledge and appraisal of its implications.

All this suggests that there will be a considerable increase in the importance in our society of intellectual institutions such as universities, consulting firms, and research organizations, both government and private. As Daniel Bell has noted:

"To say that the major institutions of the new society will be intellectual is to say that production and business decisions will be subordinated to, or will derive from, other forces in society; that the crucial decisions regarding the growth of the economy and its balance will come from government, but they will be based on government's sponsorship of research and development, of cost-effectiveness and of cost-benefit analysis."^{1/}

The second major trend, which is already apparent, particularly in the developed countries, is a lesser concern with economic growth itself, and a greater concern with how growth should be employed to improve the quality of life. This should not be interpreted as suggesting that economic growth will become unimportant. Far from it. It is simply a recognition that society must make clear priority choices about the uses to which growing resources can be put, and must give more consideration to the alleviation of various social, economic and environmental problems. These problems go beyond the usual concerns about pollution, urban congestion, noise, and so on, to the questions of social equity, of the structure of society and of the array of options that should be open to individuals. This second major trend is really the development of a growing concern with "achievement" goals in the society. Concern with "performance" goals -- those which are relevant to attaining high, sustained, stable and widely shared growth at high levels of employment -- will undoubtedly continue as important objectives. However, our interest and attention will undoubtedly turn increasingly towards three sets of more basic and more difficult issues -- the social benefits and the social costs of various patterns of growth; the purposes and ends which society will wish growth to serve; and the alternative means by which such purposes and ends can best be attained.

^{1/} "Notes on the Post-Industrial Society (I)", Public Interest, No. 6, Winter 1967.

The third major trend is that our society will tend to be increasingly shaped by our collective needs and problems, and perhaps become less individualistic. One of the most outstanding results of economic growth and development is that it has, in many different ways, enlarged the choices and options open to individuals -- a result which remains unmeasured in any of our basic indicators of economic and social progress, and one whose importance is not perhaps adequately recognized as we have come to take these widening choices for granted. For example, we have much wider choices than ever before in the range of goods and services available for consumption, in the occupations available to individuals, and in the locations in which people wish to live and work. At the same time, there has been a growing trend towards increased elements of regulation and control in our economic and social system -- to some extent reflecting attempts to cope with proliferating conflicts of interest under increasingly complex conditions, and also reflecting increasing concern for community interests relative to individual interests. In brief, we have been facing -- in new ways and to an accentuated degree -- the ancient question of appropriate trade-offs between social needs and goals and individual values and preferences.

Moreover, it is important to recognize that some of the basic forces at work are tending to move us further in the direction of greater regulation in our society. For example, increasing urbanization is placing growing burdens on our urban systems and many of its inhabitants, and if our cities in the future are to be viable and are to become places in which man can lead a good life, there will undoubtedly be a tendency to move towards a number of important limitations on the choices and actions of individuals. Similarly, as I have already implied, we need more forethought and planning for the future. But planning has the

effect of sharpening value conflicts between various interest groups as it seeks to build an appropriate social consensus out of discordant and often conflicting individual and group preferences. Even further, while modern problems are becoming increasingly complex, there remains a great human desire to find simple solutions to problems as they arise. But complex problems require complex solutions, and the latter cannot be satisfactorily found within the short-term horizons that have generally tended to preoccupy decision-makers in the past. The result is that solutions too simple for the nature of many problems may be imposed, perhaps at the cost of various elements of individual freedom of action. Finally, especially in a period of increased social tensions and frustrations, and in circumstances in which there are no easy solutions to difficult problems, there appears to be a general willingness to accept an increased degree of "social organization".

In the very broadest sense, the three major trends that I have discussed briefly, increasing multidisciplinary activities and more emphasis on synthesis of knowledge, the greater concern with achievement goals, and the increased degree of social organization, are suggested here as major underlying forces which will shape our future.

Demographic and Economic Dimensions

Before discussing some of the possible consequences of these trends to the year 2000, let me outline a few salient features of possible demographic and economic developments over the next 30 years -- such as the size and composition of the population and labour force, and the size of the economy.

Population projections look as though they should be easy to make. But in the past they have been notoriously poor. For example, 30 years ago, after the Depression decade of sharply falling birth rates, who could have visualized the huge and sustained postwar baby boom and the greatly accentuated postwar immigration, which together have swept our population up from 11 million to over 21 million today? Or, 30 years before that, in 1910, when we were in the midst of a huge tide of immigration that helped to push our population up by about 2 million over the preceding 10 years, who would have visualized that the next 30 years would see a further rise of only about 4 million? Thus, population projections must be approached with a considerable degree of caution and humility.

On the basis of assumptions that there would be some further decline in fertility rates and somewhat smaller average net inflows of migrants than in recent years, the population of Canada could rise from about 21 million this year to 25 million in 1980, 29 million in 1990 and 33 million in the year 2000 -- that is, a total increase of about 12 million in 30 years, or around 4 million persons per decade, or an average of about 400,000 per year. Perhaps it would be safer to say that the probable population growth could fall in the range of 10 to 15 million. This would imply a rate of population growth which would not be high in relation to Canada's postwar record -- but undoubtedly above that taking place in most other industrial nations.

Much more significant than the increase in Canada's total population to the year 2000, however, will be the major changes occurring in the age distribution and other characteristics of the population. In the 1970's, for example, there will be a sustained high rate of labour force growth, as well as a considerable increase in the rate of



family formation, as the leading edge of Canada's large postwar baby boom moves through their twenties and early thirties. At the same time, there will be a relative decline in the 35-55 age group -- in fact, an absolute decline in the 40-50 age group. These changes are likely to have far-reaching effects in our economic and social system -- for example, the need for accentuated growth in housing, and possible shortages of experienced managerial and supervisory personnel. At the same time, the substantial reduction in births in the 1960's will result in a fall in primary and secondary school enrolment. Also, there will be a slowing in the rate of growth in university enrolment.

The 1980's should see a slower growth of the labour force as a whole, but a very large rise in employment in the 30-45 age group. It should also be a period of slower growth in new family formation.

In the 1990's, there will be a relative increase in the proportion of the population in the prime 34-54 age group. There will again be an increase in family formation towards the end of the century, as well as a new round of stepped-up growth in secondary and post-secondary education during the 1990's.

Making allowance for more extended education of young people, as well as for more retraining and re-education of adults -- and also making allowance for a gradually rising trend of participation of women in the labour force -- the labour force could be estimated to grow from less than $8\frac{1}{2}$ million in 1970, to over $10\frac{1}{2}$ million in 1980, to around 13 million in 1990, and to be approaching 16 million by the end of this century. These estimates imply a need for a net expansion of about 2 million jobs in the 1970's, and a further $2\frac{1}{2}$ million in each of the

following decades. It should be emphasized in this context that well over half of this expansion in Canada's labour force to the year 2000 will consist of young people and women who are already alive today.

Another projection that is of special interest, because of its importance within our economy and society, is the number of housing starts that may be required from now to the end of the century. Assuming a relatively conservative 1 per cent per annum replacement rate, and taking account of the fact that the rate of increase in family formation is large in 1970 but drops off thereafter until near the end of the century, it can be estimated that we will need to build at least 6,000,000 new housing units over the next 30 years. To place this figure in perspective, it might be noted that our present stock of housing is about $5\frac{3}{4}$ million. In short, we will need to build more new housing units over the next three decades than the total in our existing housing stock.

Our present statistics for measuring the size and rate of growth of our economy are not adequate in many respects. This is not an appropriate occasion for discussing some of the deficiencies. Suffice it to say that one of the important challenges in the years ahead, as I have already suggested, will be to construct an improved set of economic and social accounts to provide more satisfactory measures of the progress of our society. But, using existing measures, let me sketch the growth possibilities for Canada to the year 2000. In the 1970's, the rate of growth of potential output of the Canadian economy should be in excess of 5 per cent a year, on the average. This is an estimate of the growth in the volume of total output which we should be able to achieve, even on rather conservative assumptions, if we

achieve reasonably full and increasingly efficient use of our growing labour and capital resources. Over the remaining 20 years of the century the potential growth rate may be somewhat less -- due, in part, to a slower rate of growth in the labour force. A reasonable potential growth target to aim for is perhaps close to 5.0 per cent a year between 1980 and the year 2000. This would result in a GNP of around \$350 billion around the end of the century -- or a per capita GNP of over \$10,000 in constant 1970 dollars (compared with a present per capita GNP of about \$3,500). Even if the performance of the economy were to fall considerably short of such a potential -- suppose it were to grow at an annual rate of only 4 per cent between 1980 and the year 2000 -- GNP would approach the \$300 billion mark, and the per capita GNP would exceed \$8,500 in constant 1970 dollars.

By today's standards, such figures appear to be very large. But, in spite of this growth, the demands and expectations of society will undoubtedly escalate strongly as well, so that by the end of the century we will still be in a situation in which our resources will be insufficient to fulfil all our goals and aspirations. Nonetheless, our conceptions of material values, of work, of what constitutes wealth and of the importance of leisure may undergo some considerable shift over the next 30 years as our economy grows and our society evolves.

There are some who raise questions about the value of economic growth as a continuing goal of our society. I feel they have missed the point. Obviously, bigger does not necessarily mean better. Nor does great national wealth assure a high quality of life for a nation's people. Nor can high incomes be equated with high satisfactions. But it is critically important to recognize that society's ability to tackle the problems of the environment, of housing, of education, of poverty

and of health care will be significantly affected by the actual growth performance of the economy. A slowing of growth through the building-up of more involuntary unemployment or part-time employment would hardly appear to be a promising avenue for dealing with some of the problems which growth generates. Nor would a slowing of long-term productivity growth appear to be any more promising -- implying, as it would, that there would be a sharpening of conflicts among competing claims on our limited resources. The most promising route towards enhancing our capacity to meet social and community needs is to enlarge the "growth dividend" in our economy. Thus, the goal of a sustained high rate of economic growth must retain a large measure of its present importance if we are to keep up with the growing aspirations and concerns of Canadians.

One of the major unresolved economic policy problems is how to achieve sustained and reasonably smooth economic growth. This is a problem which may remain with us for some time to come. There is, for example, a great need for better knowledge about how to maintain price stability within an economy. Moreover, in the future, the problem of maintaining price stability may become considerably more difficult as a rising share of national economic activity shifts to noncommercial services. One of the most basic challenges of the future is, I believe, to develop effective methods for improving productivity in the non-commercial services -- not only because this is important in its own right, under conditions of continued scarcity of productive resources, but also because it is essential for achieving good price performance in our system in the longer run. In short, just as there are important quality-of-life issues, there are important quality-of-growth issues, and a high quality of growth has reasonable price stability as one of its essential components.

Structure of the Economy of the Future

There are a few comments about the future structure of the Canadian economy which can be made with a fair degree of assurance. For instance, the shift away from the primary sector, which has been so important in the past, must necessarily moderate. After the Second World War, the proportion of our total employment in agriculture, fishing and forestry was close to 30 per cent of total employment in Canada. By the end of the 1960's, it was less than 10 per cent. Similarly, there has been a reduction of the share of these industries in the value of total output from about 15 to 5 per cent over the past two decades. A continuation of these trends, but at a more moderate rate of relative decline, will probably occur over the next three decades.

Canada's primary mineral industries are also an important, but relatively small, sector of the economy -- now accounting for about $1\frac{1}{2}$ per cent of total employment and about 4 per cent of total output. It is possible that there could be a very considerable expansion of Canadian mineral production from now to the end of the century. But for this, there will have to be a huge expansion of exports on a competitive basis, and a massive growth in capital investment. During the past decade there has been virtually no increase in employment in the mineral industries. The growth in output has been closely associated with rapidly increasing capital-intensity of mineral production. Indeed, since the early 1950's, there has been a fourfold increase in the amount of capital invested per employed person in the mineral industries. In these circumstances, it is obvious that the future of Canada's mineral industries will depend crucially on their access to extremely large amounts of capital. This will be particularly important for any effective development of the mineral resources of Canada's North. Moreover,

strong growth in these industries would also need to be accompanied by large capital investment in construction of transportation facilities and other elements of necessary infrastructure.

The large relative decline in the primary industries has been accompanied, not by relative growth of industrial goods-producing industries, such as manufacturing, but by a strong relative growth in the service industries (going hand-in-hand with shifts of population from the countryside and many small towns to the cities). The service industries include: transportation and communication; retail and wholesale trade; finance, insurance and real estate; health care and education; business and personal services; and public administration. Taken together, these already accounted for 2 out of every 5 jobs in Canada 20 years ago, and about \$1 out of every \$2 of total output in the economy. Today, they collectively account for about 60 per cent of all jobs and of total output. An important question about the future is whether or not the service sector will continue to grow relatively -- and if so, whether it may grow at the expense of the manufacturing industries. The answer to this question is far from clear. However, I suspect that some of the basic forces which I have already mentioned will tend to favour the continued relative growth of the service sector of the economy. This is entirely consistent with, and could be reinforced by increased automation in the manufacturing sector and continued relative growth of government and government-financed activities. Also, the increasing level of urbanization which we may experience between now and the end of the century could lead as well to a greater emphasis on service-oriented needs, although the demands of urban redevelopment could spur a considerable input from the manufacturing and construction sectors.

The economy of the next 30 years will be an essentially urban economy. By the end of the century perhaps 90 per cent of our population will live in urban areas, and well over one-third of the population may live in the metropolitan areas of Toronto, Montreal and Vancouver. The increasing concentration of population in the larger centres has already produced some absolute decline in Canada's rural population, and in the future the total population of our smaller urban centres may decline, too. In the United States, there is a definite hierarchy of urban growth, with the larger cities (over 500,000) growing between 10 per cent and 12 per cent over the period 1960 to 1965, and the cities with a population between 20,000 and 50,000 growing more slowly, less than 8 per cent over the same period. In Canada, we are at a somewhat earlier stage in the urbanization process, and we have a very different geographic and population density situation. Our larger cities grew around 15 per cent between 1961 and 1966, but the fastest growth (nearly 25 per cent) occurred in cities having a population of between 50,000 and 100,000 in 1966, and with strong growth still occurring (15 per cent) in cities and towns with populations of 10,000 to 25,000. In the future, however, we are, I believe, likely to evolve in the direction of the U.S. pattern, with our larger cities growing more rapidly than our smaller towns and cities.

An important aspect of future urban growth is that it is likely to become the dominating factor affecting the regional structure of Canada. In spite of major disparities in natural resources which will give relative advantages to some regions, and in spite of the probability of a tremendous growth in tourist travel and recreational activities also favouring geographic dispersal of various activities, the frontiers of Canada's future economic development will increasingly be found in our cities. The net growth in employment will occur almost entirely in

the cities. And the net growth in total output and income will undoubtedly also occur almost entirely in the cities. Any effective progress towards narrowing the large and persistent regional disparities which have existed in Canada will therefore have to take place in this context. And this, in turn, implies the need for a redirection of many aspects of regional development policies, both federal and provincial, in the future.

The Multinational Corporation

Let me now turn briefly to two special topics -- the multinational corporation, and innovation.

The role of the multinational corporation has grown dramatically over the past decade or two. Indeed, the growth of multinational firms as measured in terms of either investment or sales in world markets has been rising at a rate in excess of 10 per cent per year -- or more than twice as fast as the growth of the world economy as a whole. And there are persuasive reasons for believing that this role will become substantially more influential over the next two or three decades. Estimates by J. N. Behrman in a study prepared for the Economic Council of Canada suggest that in the next 20 years the internationally owned sector could easily account for one half of all the goods and services produced in the Free World, compared with about 15 per cent currently.

These trends have profound implications for world economic and social development. For the multinational corporation may well be, as Neil Jacoby has suggested, "the most powerful agency for regional and global economic unity that our century has produced".^{1/} It has proven

^{1/} Neil H. Jacoby, "The Multinational Corporation", the Centre Magazine, Centre for the Study of Democratic Institutions, May 1970, p. 54.

to be a major vehicle for economic progress -- this has certainly been true in the case of Canada's economic development. And it also has a substantial influence on social change. It reaches beyond national boundaries into the world arena, bringing with it capital, technology, managerial skills, marketing capabilities, and in many cases creating changed social infrastructures to support its operations. But these benefits have not been without certain costs. For multinational corporations -- perhaps to be associated, in the future, with a corresponding development of multinational unions on a major international scale -- confront nations with a series of difficult problems. The most sensitive of these tend to arise from conflicts with legal systems and with social and economic arrangements and national aspirations of the host countries. There are no easy solutions to the problems and dilemmas posed -- problems and dilemmas which are of special concern in Canada, in the light of the high degree of foreign ownership and control of Canadian industry. But there are two directions of possible future progress that would undoubtedly be highly constructive from a Canadian viewpoint -- the development of a growing number of multinational corporations originating from a Canadian base; and the evolution of multinational governmental approaches to problems and issues raised by the operations of multinational corporations. The latter would call for the harmonization of policies between countries to remove sources of frictions and misunderstandings, and to evolve improved procedures for encouraging these entities to serve the broader economic and social goals of the people in the various locations in which they are operating.

Innovation and Basic Knowledge

Innovation, like the multinational corporation, is also coming much more to the fore as a factor in national and international economic growth and development. In today's world, and no doubt still more so

in the world of tomorrow, economic wealth and power, as well as the potentials for social progress, will be increasingly conferred upon nations by managerial, scientific and engineering skills, and by strong technological and innovative capabilities. Technological innovation and the multinational firm are indeed closely interrelated. For technological innovation requires knowledge inputs from beyond the innovating firm and, especially for a relatively small country such as Canada, from beyond national boundaries. The multinational firm reaches out into world-wide markets and world-wide scientific and technical developments.

Too frequently in the past, the role of innovation in economic development has been narrowly and inappropriately defined to focus attention on scientific and technological research and developments activities. This emphasis is excessively narrow for two reasons. First, it focuses attention on the creation of new knowledge, and on invention -- whereas it is the application of both existing and new knowledge (and from both foreign and domestic sources), rather than merely the discovery of new knowledge that is important. Second, it focuses attention on scientific and engineering developments, and tends to overlook the critically important role of innovation resulting from advances in knowledge in the social and behavioural sciences.

Because technological matters have already dominated many of the discussions about the longer-term future at Conferences such as this, and because the possible course of future technological development lies far beyond my competence to assess, I do not propose to speculate about these matters here. There is no doubt, however, that by the end of the century we will be living in a society that is much more scientifically advanced than our present society. And I believe that one of the most

prominent features of the advance which will take place is that it will be more socially oriented, and not so predominantly technically oriented. In short, much more future innovational activity will occur as a result of advances in knowledge in the social and behavioural sciences.

Before we can expect major progress in social innovation, however, we will have to build up and strengthen our basic knowledge in the social sciences. For a great gap has in fact developed between the knowledge which we have accumulated in the natural sciences and the knowledge we have accumulated in the social sciences. Research and development outlays in the social sciences represent only a tiny fraction of total R&D outlays in all industrialized countries -- a high estimate might be 5 per cent. The result of this imbalance has been that, as our knowledge in the natural sciences has been applied and brought into production and use through innovative activity, the rate of technological change has speeded up enormously in this century. But there has been no corresponding increase in our capacity to manage and control this rate of change through invention and innovation in our social, political and economic arrangements and institutions. We are caught up in a race between the development of new technologies and the creation of appropriate social arrangements and institutions needed to guide, direct, and control it. The Organisation for Economic Co-Operation and Development has referred to this "lag" in the following terms:

"The problem to be faced is not simply that of enabling people to adjust to new conditions, but of helping them to understand an increasingly complex society and to find their way in its norms and institutions. There is growing realisation in every quarter of the increasing disparity between the technical resources of modern society, man's power over nature and his practical inventions on the one hand, and the new social structures in which he has to learn the art of living, the resulting new needs, aspirations and values on the other.

Research in the natural sciences reaches beyond the present technological possibilities, which themselves are in advance of present realities. In the social field, however, not only does 'social technology' lag behind but also, and above all, social research."^{1/}

I believe that during the next two or three decades we will see a major effort made to redress this imbalance. Indeed, it is clear that if we are to deal at all effectively with the human and social problems associated with modern, highly urbanized technological societies, we will have to move swiftly to strengthen our knowledge base in the social and behavioural sciences.

The Need for Goals

In concluding these remarks, I want to end on a theme which I am convinced will be the overriding and primary issue of the next two or three decades. This is the question of formulating explicit goals for our society so that our growing but still limited resources can be allocated "on the basis of some rational forethought about what we are trying to achieve as a nation and not purely in response to the pressures of the moment". To accomplish this end, we will need to develop new mechanisms and new institutions to strengthen and update our traditional mechanisms for reaching a social consensus. Far too often in the past, our choices have been made amidst a welter of conflicting claims and pressures, in isolation, as separate parts unrelated to the totality of society's aims and objectives, and without reference to any coherent, overall framework of goals and objectives. The result has frequently been to try to do too much over all, or to do too little in areas of urgent need, or to fail to anticipate problems sufficiently well in advance to avoid crises, or to perpetuate obsolete programs in pursuit of

^{1/} Organisation for Economic Co-Operation and Development, "The Social Sciences and the Policies of Governments", Paris, 1966, p. 17.

objectives which may once have been important but which have become much less so in a rapidly changing world. This is no longer good enough. The world has become far too complex for such "ad hocery" to provide a viable basis for managing a modern society.

Last year, in its Sixth Annual Review, the Economic Council recommended the creation of new machinery within the federal and provincial governments which would be designed to make possible a clearer articulation of national goals and objectives, and lead to the establishment of priorities in a more coherent, rational and systematic way. The United States has already started to move to establish new procedures for these purposes. In Canada, too, there appears to be growing support for initiatives of this kind.

The establishment of goals and priorities implies a vision of the future -- of the options, the possibilities and potentials, and the constraints. It also implies that we can achieve a synthesis of knowledge and develop people who are not only future-oriented but who are also expert generalists -- "who individually and collectively have a trained imagination and an understanding of social needs and are in positions to acquire and provide a sense of direction for society to consider".^{1/}

In conclusion, both in government and in private decision-making, we need to become more future-oriented. As Daniel Bell has emphasized:

^{1/} Christopher Wright, "Some Requirements for Viable Social Goals", Mankind 2000, Allen and Unwin, London, 1969, p. 196.

"No longer can any society afford to have problems pile up on themselves in helter-skelter form, as we see today.... There must be a systematic "national estimate" of future needs and problems, a statement of available resources, a specification of priorities, and a co-ordinated set of national goals which attempt to realize the aspirations of a people."^{1/}

^{1/} Daniel Bell, "The Balance of Power and Knowledge", Technology Review, June 1969, p. 40.

Notes for Remarks
by Arthur J. R. Smith
to Edmonton Chamber of Commerce
Edmonton, April 28, 1971

ECONOMIC GROWTH AS A NATIONAL GOAL

According to an ancient legend, there was a day "when the sun stood still" -- a phenomenon which, it is alleged, was accompanied by great tidal waves across the oceans, earthquakes and volcanic eruptions across the face of the earth, and showers of large stones from the sky. Not in legend, but in stark statistics and in the vivid memories of many living Canadians, the decade of the 1930's was a period of not dissimilar cataclysmic events in the human scale: a decade when "economic growth stood still" -- a decade of ramifying and far-reaching economic, social, ideological, and political dislocations. Indeed, the "zero growth" of the 1930's imposed widespread misery on human beings, and exposed many of mankind's institutions to searing experiences:

- losses of incomes, jobs, savings, homes
and farms;
- increased poverty and wider regional disparities;
- the virtual financial bankruptcy of various
governments, and the political overturning of
many governments;
- the demise of many business and other organizations;
- setbacks to progress in education and health care
(in Alberta, for example, expenditures on education
actually declined between 1930 and 1940, not only
per student or per teacher, but also absolutely); and

-- the weakening or severing of international links,
both economic and political.

These problems generated a deep conviction that economic depression and recession must be avoided in the future. And a broad consensus emerged, in Canada as well as in most other countries, that sustained growth at high levels of employment must be a major economic, social and political goal of any society in the modern world. Moreover, the further upheavals and distortions of the Second World War reinforced such conviction and consensus.

Accordingly, in the 1940's some of the best minds in many countries were set to work to develop new institutions and policies, both within national economies and in the international arena, for effectively achieving and maintaining high employment and sustained growth. The results of the actions that were subsequently taken have been impressive. Postwar reconstruction almost everywhere proceeded more rapidly and more smoothly than had been generally anticipated. Economic depressions have been avoided for over a quarter of a century. In the 22 nations which are currently members of the Organization for Economic Co-operation and Development (and which comprise all of the more industrially advanced countries of Europe, as well as the United States, Japan and Canada) the past 20 years have witnessed:

- an increase in the volume of output to about 2½ times the level of 1950;
- an approximate doubling in average real per capita incomes;
- persistently low rates of unemployment in most of these countries;
- a large rise in the skill and educational qualifications in the labour force;
- a substantial increase in the average amount of capital equipment and plant per employed person;
- far-reaching advances in knowledge and technology promoting more efficient use of available productive resources;
- and all of these, along with shorter average working hours, more leisure, wider choices in consumer spending, as well as wider choices about where people can work and live and enjoy vacations.

Although there have been less general and less even economic advances among the world's less industrially advanced nations -- and perhaps wider gaps between hopes and achievements -- here, too, some outstanding instances of growth have been recorded over the past 25 years. And in the 1960's, even the average rate of economic growth for all less developed countries has been about as high as the average for the more developed countries -- and certainly, very high in relation to their historical long-term growth performance.

But along with this greatly intensified postwar interest in achieving and maintaining strong growth, has come a clearer recognition of some of the appropriate perspectives in which growth should be viewed. Let me touch very briefly on a few of these.

First, a high rate of economic growth is not a goal that can be pursued in a single-minded way. There must also be regard to other basic economic performance goals. To be strong and sustained, growth must have qualitative as well as quantitative dimensions. It must involve a high rate of use of available labour, capital and other productive resources. It must be accompanied by reasonable price and cost stability. It must be solidly based on a viable international payments position. And it must reflect broad participation by the people of a country in the process of growth, as well as a broad sharing of the benefits which growth generates.

Second, the essential element of growth is productivity growth -- that is, the efficiency with which available productive resources are combined in the production of goods and services. One of the most important aspects of high productivity advances is that these can help to promote good performance in relation to other goals. Accumulating evidence from many sources suggests that high productivity growth generally tends to be associated with relative stability of costs and prices, and with relatively strong international competitive (and hence, balance of payments) capabilities. High productivity growth also tends to provide the essential basis for drawing available productive resources more fully and more consistently into

intensive and rewarding use. It likewise tends to provide relatively more favourable conditions for achieving an equitable distribution of rising incomes. Thus, high productivity growth tends to be a "reconciling factor", facilitating more consistent achievement of other goals among which there are frequently conflicts and strains.

Third, a high level of economic affluence resulting from economic growth does not appear to provide, as is sometimes believed, a tempering of desires for enlarged incomes, or a moderation in demands for more goods and services. As man's capacity to satisfy basic wants of food, shelter and clothing has advanced, other wants have emerged and proliferated. In Canada -- a country which is considered to be very affluent by international standards -- there is, I suspect, hardly any family that could not readily produce a long list of additional goods and services to which it would like to have access, if only it could afford them. Likewise, in the case of governments, business firms, medical and educational institutions, and a wide variety of other private organizations, there appear to be pervasive and pressing yearnings for larger claims upon economic resources. Affluence, therefore, does not breed contentment. Difficult choices remain about the central problem in economics -- how to allocate limited resources among many competing claimants. In these circumstances, economic growth remains an important means for meeting many of these claims out of rising productivity. Among other things, it helps to avoid some of the economic and social tensions and strains that would arise if certain new, high-priority wants and needs in our society could only be met through substantial, and perhaps increasing, reallocations of purchasing power from some segments of our society to others.

Fourth, growing criticism has been developing about some of the broad measures of economic growth used by economists -- in particular, the so-called National Accounts; and even more particularly, estimates of Gross National Product. The critical views have developed along several lines. One is that the National Accounts estimates (which have been designed to measure the output of goods and services produced in an economy and the accompanying generation of incomes) have technical and conceptual defects of various kinds -- for example, that they exclude nonpaid items, such as work done by housewives; or that in certain areas, output is measured by "input proxies", especially in the case of certain service activities, and that these may not be very good measures of output. Another, much broader, attack has been developing along the line that GNP, as some critics put it, measures the output of "goodies" but not the output of "baddies" -- that, for example, GNP includes estimates of increased production of minerals, machinery and processed commodities, but not the effects which such rising production may have on pollution of our environment, or congestion in our cities. Obviously there are certain "negative externalities", as economists sometimes gracelessly call them, in GNP growth. But the criticism along these lines appears thus far to have been generally too narrow and one-sided. For there are also positive aspects involved in GNP growth that are also not adequately measured, or not measured at all -- increased leisure, improved quality of many goods and services, and wider choices for people with respect to the goods and services they can buy, the occupations in which they can work, and the locations in which they can live or visit.

More basically, the criticism of GNP along these lines has, I think, been inappropriate, in the sense that it has been developing into a "straw man" attack -- an attack on what some apparently believe is a "measure of human welfare", rather than a measure of economic output. These two things are, of course, quite different. In its last Annual Review, the Economic Council put this matter in the following terms:

That economic growth, as it is conventionally estimated, is a questionable indicator of human welfare is, of course, not a new notion. Few societies or individuals have failed to make some distinction between maximum and desirable growth. The goals of all societies include a wide range of human values that are not adequately reflected in measurements of their gross national products. Few major decisions of governments, business firms or individuals are made on the basis of economic considerations alone, and fewer still on the sole criterion of maximizing output or income.

The simple fact is that GNP was never intended to stand for Great National Purpose, or for the Goals and Needs of People. Total GNP is simply an estimate of the total output of goods and services. As the more sophisticated appraisers of the subject of economic growth and the "quality of life" are already coming to appreciate, the critical questions about GNP growth therefore do not arise so much from the deficiencies in GNP measurement (or even about the rate of growth of total output), as from the purposes and ends to which we direct our productive efforts. At least at the present stage of development in a country such as Canada, the most important issue is not to moderate economic growth (especially productivity growth), but to enlarge our concern with the harnessing of our productive resources more effectively to those goals and objectives towards which, on the basis of a broad social consensus, we believe we should be striving.

In this context, high and sustained economic growth must remain an important national goal. If we cannot achieve this, many of the most basic hopes and aspirations of our society will be much more difficult to attain, as the 1930's so dramatically revealed. In fact, without a good growth performance, not only would we have to contend with the problems and human costs of high unemployment, but would also have to face much more difficult choices in our progress towards a higher quality of life. For most of the things that are involved in such progress -- not merely in terms of higher material standards of living, but also in terms of larger initiatives in cultural, environmental and social fields -- require increased economic resources for their realization.

How we can best nourish and sustain high, stable and widely-shared economic growth will thus remain a key area of economic policy-making. This will be so at least as long as we have, for our society as a whole, a totality of wants and aspirations that cannot be satisfied with available resources, and are having to make tough choices about the priorities that we wish to set among many different resource-demanding objectives -- to mention only a few, objectives such as more personal consumption, improved health care, better education, more adequate housing, reduced regional disparities, the elimination of poverty, aid to less developed countries, peace and international stability, improved transportation, pollution abatement, beautification of our cities and a higher quality of urban life, encouragement of the arts, creation of new knowledge, and resource conservation.

The Economic Council of Canada emerged, as you may recall, against the background of slow economic growth in Canada in the latter part of the 1950's -- when output and incomes fell substantially below rising potentials, and when the economy also fell short of other standards of good performance -- for example, in terms of balance of payments viability. Since the establishment of the Council in 1963, we have focused the major part of our work on the central question of how to develop basic policy strategies for promoting consistently better performance in the medium- and longer-term future in regard to our basic economic and social goals and potentials. We have also regularly assessed the actual performance and progress of the economy in relation to such goals and potentials.

How has the Canadian economy in fact been performing? Some basic features of its performance will be depicted in the Chart presentation following my remarks. In brief, what these charts portray is the following:

1. Economic growth slowed sharply in 1970. This was mainly a lagged response to the building up in 1969 of what was perhaps the most vigorously restraining combination of monetary and fiscal policies in Canada in over 20 years. A substantial gap has emerged between actual and potential output. This gap is now running at an annual rate of around \$3½ billion (about 4 per cent below potential). In other words, this is the shortfall from levels of output and income which might have been achieved with reasonably full use of available productive resources. Another major

contributing factor to the economic slowdown in 1970 was the simultaneous sharp slowdown in the U.S. economy and the emergence of a very large gap between actual and potential output in that country. In the fourth quarter of 1970, the Gross National Product in the United States was running $6\frac{1}{2}$ per cent below potential, representing a shortfall in income and output of about \$65 billion at an annual rate.

2. Some of the indicators and consequences of the Canadian "gap" are:

- a virtual halt to expansion of real domestic demand, with exports of goods and services accounting for almost \$4 out of every \$5 of the overall expansion of real demand and output between 1969 and 1970; in other words, in the absence of strong external demand forces, much higher unemployment and more economic slack would have developed in Canada during 1970;
- the smallest growth of employment in 1970 since the 1961 recession; the highest rate of unemployment since 1961 (about $6\frac{1}{2}$ per cent in the last half of 1970); and reduced average hours of work among the employed;
- a slowdown in productivity gains in certain areas of the economy, such as manufacturing;

- depressed business profits (now at the lowest level in relation to Gross National Product of the whole postwar period), and underutilized productive facilities in various industries;
- depressed government revenues (if the economy had been close to potential output, the total revenues of all governments would now be running at an annual rate of more than a billion dollars above current levels); and
- an aggravation of the deep-seated problems of poverty and regional disparities in the context of the slowdown in overall economic activity.

3. Price increases moderated during the past year. This partly reflected a natural lagged response to the slowing of domestic demand growth. It also partly reflected the higher exchange rate for the Canadian dollar, depressed business profits, and some special factors, such as those operating to reduce food prices and farm incomes. Average wage and salary increases are still very high, but costs, including labour costs, may now be in process of moderating. An acceleration of productivity gains would contribute to more moderate increases in wage and salary costs in 1971. But both price and cost increases are proving to be a very widespread and troublesome problem throughout much of the world, and a number of factors could make it difficult to

hold average annual rates of increase in Canada in the 1970's to the average rates of the 1960's, except at substantial costs in terms of higher unemployment and larger economic slack.

4. Against the background of the above conditions, Canada's international trade and payments position has been exceptionally strong. Exports have been high, though not rising in 1970, while imports have been depressed by weak domestic demand conditions. An unprecedented surplus of \$3.0 billion on merchandise trade was recorded in 1970, and the current account position swung sharply into surplus for the first time since 1952. This shift has been an important contributing factor to the rise in the exchange value of the Canadian dollar during the past year. The trade and payments position may continue to remain strong through 1971, especially if stronger growth is restored within the United States.

5. The moves towards easing restraint policies in the spring of 1970 were initially gradual and cautious. These changes -- changes that typically affect economic activity after relatively long lags -- were not adequate to begin to reduce economic slack significantly before the end of 1970. But they have helped to avert any further significant build-up in slack, at least as the economy moves through the earlier part of 1971. At the same time, relatively high levels of unemployment (on a seasonally adjusted basis) may well persist through 1971, and the average rate of unemployment

for the year as a whole may be not much below that in 1970. This would not be inconsistent with a significantly faster rate of growth of output than in 1970 -- the volume of total output in 1970 was less than $3\frac{1}{2}$ per cent above 1969 -- since the economy must grow by over 5 per cent simply to keep pace with its expanding manpower and output potentials. In its earlier stages, even a rapid upswing is likely to reflect not so much a swift growth of employment (and reduced unemployment) as increases in average hours of work and larger-than-usual productivity gains. Also, with renewed expansion, there may well be a tendency to experience a faster growth in the total numbers seeking work, as some workers previously discouraged from looking for work under soft labour market conditions seek to return to the labour market.

6. Monetary expansion, leading towards increased credit availability and reduced credit costs in the latter part of 1970, has undoubtedly provided a basis for stronger growth, although with varying lags for different kinds of economic activities. Relatively early effects are typical for activities such as housing that are closely linked to financial markets; other sectors are usually affected with longer lags. The main impact on overall levels of economic activity of the substantial monetary expansion late in 1970 and early in 1971 may not be felt until next year.

7. On the other hand, rather long-lagged adverse effects on production and trade are still to be felt (probably over at least the next two years) from the impact of the higher exchange rate on the international competitive position of various Canadian industries.

8. Fiscal policy continues to remain in an apparently overall restraining posture. There has been a significant shift towards less restraint over the course of the past 12 months. But the most recent National Accounts information indicates that in overall terms (that is, for all levels of government combined), there was still a high employment budget surplus in the neighbourhood of \$2.0 billion in the fourth quarter of 1970. Deficits, such as those now appearing in the federal and some provincial budgetary accounts can largely be interpreted, not so much as "budgets in disequilibrium" as a reflection of the "economy in disequilibrium" (i.e., reflecting, to a considerable extent, depressed tax revenues associated with economic slack). In short, the total fiscal posture in Canada at present is probably still tending to hold the economy below potential and to inhibit the restoration of needed growth momentum in broad terms.

9. A large, powerful and sustained expansion of the Canadian economy is required not only through 1971, but over the next three or four years, to bring the economy back reasonably close to its rapidly growing potential output path. Some indication of this can be gleaned from the estimate that it would require a real growth rate of around $6\frac{1}{2}$ per cent per year over the next three years to reduce unemployment to about 4 per cent. In other words, it would take a sustained growth rate,

approximately that of the high-growth 1963-66 period, to restore high employment from now to early 1974. Thus there is ample scope for the economy to grow rapidly for two or three years without excessive general demand pressures.

10. After the present large gap between actual and potential output has begun to close significantly, timely consideration will be needed -- well before the economy actually nears potential output -- to setting the stage (again, with an awareness of the long lags with which the economy is affected by policy changes) for moderating the rate of growth in order to achieve a gradual closing of the gap in the later stages of this process. If not, the problems of the past few years will recur, perhaps by the mid-1970's.

Finally, it should be emphasized that during the 1970's, we will be in a period of persistent high growth potentials for the Canadian economy. The broad contours of these potentials for 1967-75 were outlined in the Economic Council's Sixth Annual Review. Next year, we will reassess these potentials, and extend the time horizon of our analysis to the latter part of the 1970's. Early indications are that the growth potentials for the latter part of the decade will be virtually as high as for the first part. In addition, we start the decade with relatively high unemployment and a significant amount of slack in the economy. If anything, this should provide some added margin for growth during the 1970's, on the basis of some narrowing of the present gap between actual and potential output. Thus, in my judgment, Canadians can look

forward confidently to very large economic advances over the medium-term future. How best to prepare to take advantage of the opportunities this will afford should now be the central challenge to forward-looking decision-makers. This conference should provide an excellent means for focusing attention on this challenge.

Address by Arthur J. R. Smith
to Ottawa Branch
American Statistical Association
Dominion Bureau of Statistics
April 29, 1971

CANADA IN A METRIC WORLD

Most of us have spent the largest part of our lives in a "non-metric" world -- in an inch-pound-gallon-acre-ton milieu. We buy our food by the *pound* or *quart* or *fluid ounce*; we travel so many *miles* to reach a destination; we keep our houses at about 70 *degrees Fahrenheit*; and we have learned in school (and most probably forgotten) the complexities of measures such as the *bushel*, the *rod* and the *dram*. Only when we travel abroad or enter the world of science do we encounter the full range of the logical and simple system of measurements known properly as the *Système International d'Unités* or SI, but more commonly referred to as the *metric system*.

However, the importance of the metric system in Canada is bound to increase in the future. This became particularly evident with the release by the federal Government in January 1970, of the White Paper entitled "Metric Conversion in Canada". Taking into account the breadth of the use of the metric system throughout the world, and the views of industry, consumer associations and other groups in Canada, this White Paper recognized and accepted three basic principles for guiding future government policy in this area:

THE HISTORY OF THE CITY OF BOSTON

BY
JOSEPH NEALE

IN TWO VOLUMES.
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- (1) The eventual adoption in Canadian usage of a single coherent measurement system based on metric units should be acknowledged as inevitable and in the national interest.
- (2) This single system should come to be used for all measurement purposes required under legislation, and generally accepted for all measurement purposes.
- (3) Planning and preparation in the public and private sectors should be encouraged in such a manner as to achieve the maximum benefits at minimum costs to the public, to industry, and to government at all levels.

No specific time limit was set in the White Paper for the conversion, but the paper noted that information on the metric system should be made readily available to the public, and that the introduction of the system should be encouraged wherever the benefits are clear and the costs minimum.

What lies behind this statement of principles? How important is it to seek to adopt this simpler and more coherent system of measures? What has brought the federal government to the recognition that we must inevitably live in a metric milieu? This White Paper was not a document which received wide publicity. Yet it could have profound and far-reaching effects on our society and economy.

The desire to measure and order physical objects and forces is one of those fundamental aspects which distinguishes a civilized society. Many of man's earliest written records are concerned with commercial transactions in which certain specific measures of goods were sold or exchanged. As man's knowledge of the world around him has become more sophisticated, his interest



in refining the measures by which he defines the height and length and weight and intensity of things has increased. As Lord Kelvin once said:

"When you can measure what you are speaking about and express it in numbers, you know something about it."

However, because of the poor communications and localized trade patterns common in Western countries from the fall of Rome until modern times, a vast array of measures and systems of measures evolved separately. Many of these measures have passed into history, but a bewildering array of remnants can still be found -- an array of striking variety and incompatibility. For example, from Great Britain there comes the English *ell* (4 feet), which is mentioned in the Magna Carta, the *minim* (1/480 fluid ounce), the *rood* (1/4 acre), and the *scruple* (20 grains). From France comes the *brasse* (1.62 metres), the *marc* (0.2448 kilograms), and the *toise* (1.949 metres); from Belgium the *boisseau* (15 litres); from Germany the *fass* (1 hectolitre), the *kette* (10 metres), the *maass* (1.837 litres) and the *scheffel* (50 litres); from Portugal the *arroba* (15 kilograms) and the *covado* (0.66 metres); and from Switzerland the *immi* (1.5 litres), the *stunde* (4.8 kilometres) and the *zol* (0.03 metres).

In Canada we have a complex set of legally recognized non-metric units, based largely on the British system. In spite of the fact that these units make up our official system, many Canadians would find some of them quite unfamiliar, such as the *gill* (1/32 of an imperial gallon), the *link* (0.22 yard) and the *fluid dram* (1/1280 gallon). Even for more familiar measures,



the conversion factors are far from common knowledge. How many Canadians would be able to say promptly how many *furlongs* there are in a mile (8), how many *grains* in an avoirdupois pound (7,000), how many *fluid ounces* in a gallon (160), or how many cubic feet in a *cord* (128)? Remarkably few, I suspect. And as if these complexities were not enough, a series of additional measures are legally recognized and used for certain purposes in Québec and Newfoundland. In Québec, some land is still legally described using the *Paris foot* (12.8 inches), the *arpent* (180 Paris feet or 32,400 square Paris feet) and the *perche* (18 Paris feet or 324 square Paris feet). In Newfoundland, measures such as the *hogshead* (54 gallons), the *herring tub* (16 gallons), and the *coal tub* (100 lbs.) are still known. So, even at present in Canada we are faced with a confusing array of units, the conversion factors for which are far from simple.

In the past, Western society could live comfortably with a variety of disparate measures and systems of measures. But as our society has become more technologically oriented, particularly over the last two centuries, and as international trade has grown to large dimensions, the importance of having *compatible* and *accurate* physical measures has increased considerably. We cannot afford the error in measurements that was once acceptable; for instance, the tolerances for error within the design of today's aircraft engines are minute relative to those in the design of the early steam engines.

With respect to compatibility, there are considerable problems both within systems and between systems. For example, the gallon in the United Kingdom is 10 parts in a million smaller

than the Canadian gallon, and up to 1939, the yard employed in the United States was 4 parts in a million larger than the yard used in the United Kingdom.

The complexity of the conversion factors between the major systems makes compatibility awkward and a high degree of accuracy between systems difficult. For instance, the international pound of the British system is equivalent to 0.45359237 kilograms. Obviously, rapid and accurate conversion between these two measures of mass is not simple, and the possibilities for error are significant.

Even within the metric system there have been problems with accuracy. The litre was originally defined, for example, as the volume filled by one kilogram of water at maximum density. This was thought to be equivalent to exactly 1,000 cubic centimetres. However, later measures showed the litre to be equivalent to 1,000.028 cubic centimetres, and so in 1964 the litre was dropped as an independent SI unit of measure.

All these factors have combined to make the necessity for a common and universal system of measurement apparent, particularly as our technological sophistication continues to grow. The metric system is in the process of becoming that common system because of its directness and simplicity. Since its introduction in the late eighteenth century, it has spread, first throughout the domain of science, and then to common usage in the majority of countries in the world.



A brief history of the metric system is perhaps pertinent at this point. The basic idea of a decimal system of units has been generally attributed to Simon Stevin, a Dutchman, whose life spanned the late sixteenth and early seventeenth centuries (this eminent gentleman, incidentally, was also responsible for the concept of decimal fractions). Gabriel Mouton in France first proposed a comprehensive decimal system of measurement in 1670, and suggested this be based in some fashion on the length of an arc of one minute of the great circle of the earth. However, no action was taken until the revolutionary government in France indicated the desire in 1789 to have a simple system of measures devised, and to have this system supplant the diverse measures in use throughout France at that time. The French scientists to whom they turned, however, felt that the system they derived should have universal appeal. They proposed a system in which the metre was defined as one ten-millionth part of a meridian quadrant of the earth, and the gram as the mass of one cubic centimetre of water at the temperature at which water is most dense. The general plan for this simple system was approved by the National Assembly in 1791, by surveys and other measurements necessary to establish the measures accurately were not completed till 1798. In 1799 the metric system was adopted as the basis of all measurements in France.

Real acceptance of the new system came only very slowly, however. The traditional is not easily forsaken by man. In fact, in 1837, the French government found it necessary to pass a law forbidding the common use of the older systems of measurement after 1840. The acceptance of the metric system subsequently became firmly established in France. Moreover, it also spread



gradually beyond the borders of France; and in 1875 the Treaty of the Metre was signed in Paris. Eighteen governments (including, paradoxically, the United States) soon ratified this treaty. The treaty formally recognized the metric system as a major system of measurement, and recognized also the necessity to refine the system continually. A permanent organization, the International Bureau of Weights and Measures, was established under the terms of the original treaty, and still exists. Its office is located near Paris. The direction of the Bureau is under the International Committee on Weights and Measures. At present there are 40 countries that adhere to the treaty and they are called to meet in a General Conference of Weights and Measures by the International Committee on Weights and Measures at least once every six years. Canada has been one of the adherents since 1907.

However, the metric system, as understood at the time of the signing of the treaty, was not a complete or coherent system. A long study was undertaken, starting in 1913, to devise a fully integrated and complete set of measures. This resulted, although not until after the Second World War, in approval being given by the General Conference on Weights and Measures to the International System of Units, designated SI (for *Système International*). This system (still commonly called the metric system, as noted earlier) consists of six basic units, and the coherent units derived from them. The six measures are for length (metre), mass (kilogram), time (second), electric current (ampere), absolute temperature (degree Kelvin or its Centigrade equivalent), and luminous intensity (candela). When references are made to "metric conversion" now, they almost invariably mean conversion to this system of SI units.

The major alternative to the metric system remains the inch/pound system, but it is becoming a narrowly based alternative. For many years the main users of this system have been the United States and the British Commonwealth nations. However, newly emerging nations (other than some former British colonies) have tended to opt for the metric system because of its simplicity, its scientific basis, and its widespread usage. Moreover, the ranks of those countries using the inch/pound system and other non-metric systems have thinned over the years. India enacted a law in 1958 which made the metric system the only legal system after 1968; although the metric system had been legal in India since the 1870's, it was not in common usage. Japan has virtually completed a lengthy conversion to the metric system, and South Africa, Australia, New Zealand and Ireland are in the process of converting. Significantly, the United States is on the verge of completing a lengthy study on the subject of metric conversion. This study is scheduled to be released during 1971, and could well have a large impact on Canadian thinking with respect to conversion.

However, the most startling defection from the inch/pound ranks occurred when the United Kingdom decided, in 1965, to convert to the metric system by 1975. The pressure behind this change came, to a large degree, from British industry. The probability that the United Kingdom would enter the European Economic Community, and the fact that over 50 per cent of the foreign trade of the United Kingdom is with metric countries, obviously lay behind the industrial sector's assessment of the situation.



Thus, gradually over time, the use of the metric system has been spreading throughout the world. At present, about 90 per cent of the world's population lives in countries which use the metric system as their primary system of measurement, or in countries in the process of metric conversion. Further, 65 per cent of world trade occurs between metric countries. So Canada now finds itself part of an inch/pound North American island in a basically metric world. Only a few other relatively small countries are still inch/pound-oriented. The world-wide trend towards the metric system has long been obvious, and it is only a matter of time before it is virtually complete.

In actual fact, the metric system has already made considerable practical inroads in Canada. Three of the six basic SI units are in full use, namely, the ampere, the candela and the second, leaving only the introduction of the metre, kilogram and degree Kelvin (or the Centigrade equivalent). Additionally, we use a decimal currency. Metric units are used nearly exclusively in scientific work and in much technological work. The pharmaceutical industry (in both Canada and the United States) has converted entirely to the metric system, and other industries are moving in this direction. For instance, our optical, photographic and electronic industries are partially or mainly oriented to the metric system. Additionally, many of our major hospitals have "gone metric". All these are significant movements in the direction of "metrication". Nonetheless, we have a long way to go before we become a metric nation.

Metrication is a multi-stage process, not one that occurs in a single step. But within these stages, there are four broad levels of acceptance of the system which can be distinguished. First, there is *legalization* -- the recognition of the metric system as a legitimate system of measures. The metric system is legal in both Canada and the United States -- and has been legal in Canada since 1873.

The next level is *adaption*, in which the metric system and another system are used side by side. This is usually a transitory stage. The units of the older system are "translated" (on labels, in documents, etc.) into the equivalent metric units, but the basic "language" of measurement is still founded in the older system. By this it is meant that common dimensions and weights will generally tend to appear as round numbers in the old system, rather than in the metric translations. For instance, a five-pound bag of flour or sugar would also be labeled, parenthetically, 2.27 kilograms or $2\frac{1}{4}$ kilograms. This is, in fact, already being done in Canada for many food products.

Conversion is the third level of acceptance of the system. This level has considerable economic implications, because it implies not only the use of metric units for all measures, but it also implies, because of our propensity to use (and the convenience of) round numbers for common weights and dimensions, that the dimensions and weights of many consumer goods, industrial products and so on will have to be changed. The trade with metric nations and the need for international standards would tend to channel these changes in specific directions. In other

words, after conversion, not only are the units metric, but the basic language of measurement would be founded in the metric system. After conversion, for example, the five-pound bag of flour or sugar would no longer exist, and would be replaced by a two-kilogram bag of the same commodity.

The final stage is *compulsory usage*. At this point, the use of other systems is essentially forbidden, except in particular situations. Even France, for example, only adopted this stage as late as 1961 when the use of other systems for industry and commerce was prohibited, except for international commerce. The decree also prohibits the sale, purchase, or use of any instrument in which the gradations are given in other than metric units, except for historical, artistic or scientific purposes. The same sort of legislation has been passed in other countries, such as Venezuela (1964) and India (1968).

In Canada, we passed the first stage nearly a century ago, but we have not, on the average, advanced very much further, except in particular sectors and in our scientific activities. Great difficulties have to be overcome, and these are magnified by the nature of our relationship with our major trading partner, the United States.

In a sense, we face a difficult dilemma. We cannot convert to the metric system at a rate which far outstrips any U.S. moves in this direction. The magnitude of our trade with the United States, the existence of a great many U.S. subsidiaries in Canada (some of which are closely integrated with their parent company's operations), and the related commonality of many of

our capital and consumer goods, would make this exceedingly difficult, if not impractical. For instance, the rationalization of the automobile industry in North America, which has been to the advantage of both countries, would be upset considerably if the cars produced in Canada were made to metric-oriented dimensions and specifications, and those in the United States to inch/pound dimensions. Parenthetically, however, it is interesting to note that the Ford Motor Company in the United States has come out publicly in favour of metrication, and that the subsidiaries of all the "Big Three" U.S. automobile companies use metric measures in their European plants.

On the other hand, we cannot afford to ignore the implications of the basic world-wide trend towards the metric system, and, indeed, an awareness of the inevitability of this trend comes through clearly in the government's White Paper. The degree of dependence of our economy on foreign trade underlines the importance to us of the actions of other countries in this area. Most of our other major trading partners use the metric system, or are in the process of conversion. Further, we must be prepared for the possibility of significant moves towards metrication in the future by the United States, so that we are not left behind. Indeed, we very much need to be constantly aware of the situation in the United States, and to develop carefully considered views of the particular problems that conversion may create in Canada, so that when the time comes to act, we will be able to do so with confidence, knowledge, and dispatch.

Thus, we will probably live for a period of time with a foot in each world. It is to our advantage that this period of transition be as short as possible. Although, as I noted earlier, there are difficulties in moving too quickly or too slowly towards metrication relative to the United States, nonetheless, there are reasons for moving somewhat more rapidly towards conversion than our neighbours to the south. Perhaps the most important of these is that this may, in some cases, give us a comparative advantage where we are in competition with the United States for certain promising markets in metric countries.

There are certain relatively simple actions which could be taken immediately in Canada that would move us measurably along the road to metrication. One of these would be to start the ball rolling on the replacement of the Fahrenheit scale with the Centigrade scale. An initial step in this direction could be taken, quite simply, by reporting the daily atmospheric temperatures in both units for a period of time, and then dropping the Fahrenheit units -- a procedure that was used in the United Kingdom. This would have the advantage of familiarizing people with the Centigrade scale in a very general manner. Paradoxically, upper atmosphere temperatures are already recorded in the latter scale by the federal meteorological service. Further steps involving the changing of the temperature scale on kitchen appliances, on fever thermometers, on industrial gauges, and so on, would be more complicated. But they would be relatively easy and inexpensive if phased over a reasonable time period and accompanied by a program of public education.

With respect to the more general aspects of metrication, conversion should be expedited where the costs are minimal, or where there are obvious economic advantages to be gained. As will be indicated later, the rate of conversion in the more difficult sectors should be phased to avoid the excessive costs which could well be associated with a mandatory once-and-for-all change over a short time period. In line with this, much more serious consideration than is being given at present should be directed to uncovering the magnitude and range of the economic and social costs and benefits of conversion.

What are some of the *costs or disadvantages* of conversion, and what are some of the *economic and social benefits*? First of all, one finds that countries which have recently carried out complete conversion, such as India and Japan, have found that the costs of conversion, on the whole, were less than had been estimated. The indications from the United Kingdom are that their costs are also turning out to be less than had been expected. Nonetheless, there will be substantial initial costs involved, even though these can be mitigated by phasing.

In general, with respect to the cost and benefits of conversion, the movement to the metric system by Canada will undoubtedly be beneficial over the longer term to both our export and import trade, since it will constitute the removal of what is essentially a nontariff trade barrier. Increases in exports and in imports both mean the creation of better jobs for Canadians. The results for Canadian industry will be increased productivity (partially because of the greater simplicity of the system and the rationalization involved in adopting it), lower prices for

materials and equipment (because of the improved access for foreign suppliers to Canadian markets and increased specialization and efficiencies among Canadian producers), and improved general competition (which will also lead to increased productivity). Over all, the introduction of the metric system would undoubtedly have a positive effect on our economic growth.

More specifically, the costs and benefits of metrication can be broken into two categories, those associated with "software" conversion and those associated with "hardware" conversion. The problems associated with software conversion are less difficult to solve, partially because their economic impact is less severe, or can be more easily attenuated than is the case on the hardware side of things. Also, the problems of software and hardware conversion are fundamentally different in nature and require different strategies and approaches. Conversion with respect to software is to a large extent a problem of "translation" and of the education of the public. However, our preference for round numbers has resulted in the embodiment of the inch/pound system in machines, instruments, materials and other hardware, just as the preference for round numbers by metric users has resulted in the embodiment of that system in their hardware. Our modules are inch-based, while modules based on SI units are metre-based. Hence real conversion with respect to the hardware side of things often means redesign and replacement, since nice round numbers in millimetres and kilograms are seldom nice round numbers in inches or pounds.

Typical software-oriented problems that would be encountered during conversion include the reorientation of certain aspects of the field of education, the familiarizing of workers with the metric system, the retabulation of existing data, the rewriting of certain computer programs and the revision of some legislation, regulations, and standards.

Within our educational system, metric conversion means that certain courses will have to be revised and restructured, and many textbooks changed. Many scientific texts, fortunately, are already metric-oriented. Those changes which would be necessary would involve some expense, but these costs could be small if the change-over occurred gradually, since textbooks are presently changed and rewritten with considerable frequency at all levels of education.

On the other side of the coin, the educational system will derive certain benefits from metrication. For example, studies indicate that there is roughly a 25 per cent saving of time in teaching arithmetic and related subjects in the metric system as opposed to the inch/pound system. The tables of obscure imperial and other measures which we all had to learn as children will fade from the curricula.

The accustoming of those in the labour force to the metric system presents certain initial problems and expenses. The main problem will be to get people used to thinking directly in metric terms (rather than translating from one system to the other), and the initial expenses will include the direct costs of retraining as well as the costs incurred by the inevitable

mistakes resulting from the confusion that will be created by the change-over. However, the difficulties and expenses involved will be somewhat lessened by the presence in our labour force of a significant number who have received at least some of their education in metric countries. Certain longer-term benefits, on the other hand, may result from the use of the metric system by the labour force. Principally, the greater simplicity of the metric system will lead to fewer errors being made in the calculations involved in various industrial activities, after familiarization with the system has been achieved.

The rewriting of computer programs and the retabulation of certain data will also contribute to the direct costs of conversion. For instance, some of the computer programs and existing data of the Dominion Bureau of Statistics will have to be converted to metric units. The phasing of metrication so that as many of the changes as possible can be made simultaneous with the development of new data sources or with the writing of new computer programs intended to replace older, less efficient programs, would help to keep the costs within reason.

One very time-consuming conversion activity in the software area would involve the rewriting of legislation, regulations and standards. The time and expense involved in this exercise could, however, be turned to advantage if the standards and regulations were reviewed and upgraded in a systematic and coherent fashion. The benefits from this rationalization and updating could easily offset a significant proportion of the costs.

Other aspects of costs involved in the software side of conversion would include the metrication of the Post Office with respect to their tariff regulations on weight and distance, the conversion of survey maps to metric scale, and the metrication of road signs and automobile speedometers. All of these matters require a systematically designed program involving public education, with special emphasis on those involving public safety (such as the change of speedometers). But they could be accomplished over a five- or ten-year period at relatively low real cost. Road signs, for instance, must be replaced periodically due to aging, or to changes in regulations. The proper timing of the conversion could lead to relatively low additional costs.

On the hardware side of matters, however, the problems are more formidable. The initial costs incurred during the period of conversion could be quite large, although no detailed estimates have been made for Canada. However, as indicated earlier, the expense of conversion has been found to be less than originally estimated by those countries which have undergone metrication. In general, these countries undergoing conversion have provided little in the way of subsidies to industry for the hardware aspects of conversion. There are several reasons for this. First, if the conversion is properly planned in the various industrial sectors, in consultation with related industrial sectors and with their customers, and if it is phased over a realistic time period, many of the expenses could not be categorized as additional since they would be for the replacement of obsolete equipment which would have to be replaced in any event. At the same time, in many situations there are recognizable medium- and

long-term benefits associated with the hardware aspects of conversion. Principally, these come in the form of increased opportunities for trade with other metric countries, as indicated earlier, and the rationalization of production made possible by a more coherent and simpler system of measures. Previously, industry in the United Kingdom, for example, was producing for the internal and North American inch/pound market on one hand, and for the metric European market on the other. Soon, the vast bulk of the production of British industry will be for metric markets (including, most importantly, the domestic market). This will inevitably lead to more efficient production.

As I noted previously, the hardware aspects of metrication involve physical entities, such as machines and instruments, and the change of common dimensions for many goods. The change from inch/pound-based modules to metric modules will affect a wide range of Canadian industrial production. However, there are some industrial sectors which will be less affected than others. First of all, there are those industries whose inch/pound-based standards are accepted on a world-wide basis, and are unlikely to be changed. For instance, most industrial nations, metric and non-metric, have adopted U.S. standard sizes for automobile tires and oil field equipment, even though these are inch/pound-based. Similarly, the high precision fasteners used on a world-wide basis by the aircraft industry are recognized in standards established by the International Standards Organization, in spite of the fact that they are inch/pound-based, simply because they are part of the ABC (American-British-Canadian) System for screw fasteners and this system is the most precise and sophisticated system of its

type in the world. In the second place, many industries in Canada are already in the process of conversion, or have completed conversion. These include those industries mentioned earlier, namely, the pharmaceutical, photographic, optical and electronics industries. But there would, of course, be a number of industries which will be considerably affected.

Major initial costs may be experienced by those industries which have considerable investments in capital equipment, such as machine tools. The switching of measuring devices such as gauge blocks, screw measuring machines, and weighing scales will also involve costs in many sectors of both the goods-producing and service industries, and the largest problems of all will probably result from changes in screw thread sizes. Again, however, these costs can be minimized by proper planning and co-ordination in the program of metric conversion. Benefits can also be derived from metrication if the conversion is accompanied by new standards which reduce the irrationally large collections of sizes found among such goods as twist drills, fasteners, and paper products (especially paper and envelope sizes).

Retail packaging will have to undergo considerable changes with metrication, and these will involve sizable initial costs to industry. On the benefit side, however, metrication, and the simpler standards that will undoubtedly accompany it, will enable the consumers to determine more readily than at present exactly how much they are getting for a certain price.

The dimensions of some building materials will have to be changed with conversion to the metric system, but this could also result in a reduction of the present excessive variety of product sizes (and thus greater productivity) if modular metric standards were introduced simultaneously. Already, our wood products industries have been active in the area of modular metric standards. They have been working closely with the International Standards Organization in order to derive a schedule of timber sizes that would allow Canadian producers to sell to both U.S. and European markets from the same schedule. The number of listings on this schedule is kept to a minimum. If the Canadian producers had to produce one complete set of sizes for the U.S. and Canadian markets, and another set for the European market, the additional costs would be very high. Although the schedule is metric-based, it has sizes that correspond to some of the inch-based dimensions used in North America.

On the other hand, it is important to remember that there are extra expenditures for many Canadian industries which result from being part of the last inch/pound stronghold in a metric world. These expenditures arise, in part, as a consequence of the necessity in many cases to maintain double inventories. As long as North America remains inch/pound-oriented, our industries will be at a competitive disadvantage, a disadvantage which will vanish once the metric system is adopted by Canada and the United States.

In general, those industries which are significantly involved in the importing and exporting of goods should take a closer look, if they have not already done so, at the pros and

cons of conversion. As I mentioned earlier, a number of Canadian industries have already found it to their advantage to convert or begin the conversion to the metric system. Other industries, such as the electrical industry, should perhaps now give additional consideration to the ramifications of metrication.

It is important to bear in mind that the costs of metrication occur mostly during the initial period of conversion, whereas the benefits endure. A major factor in the endurance of these benefits will be the metrication of our standards. If our standards are brought into line with existing international metric-based standards, important benefits may be derived from increased international trade. On the other hand, there are costs associated with inaction with respect to metrication and the alignment of our standards with international standards. International standards are only in their infancy, but as they continue to develop and evolve, we will find our access to world markets and foreign goods more and more hindered if our standards remain inch/pound-oriented. The success of the wood producers cannot easily be duplicated. It will be harder and harder for us to develop or amend inch/pound standards so that they are compatible with the array of metric-based international standards which will continue to emerge. There will exist significant, and perhaps increasing, barriers to beneficial foreign trade as long as our standards remain inch/pound-oriented.

As suggested earlier, the U.K. experience indicates that even the initial costs are not as onerous as expected; sometimes they are even outweighed by the immediate benefits.

For example, two British engineering companies estimate that metrication is costing them only between 0.5 per cent and 1.0 per cent of their annual turnover over a three- or four-year period. Further, a U.K. designer and builder of steel plants found that metrication actually resulted in an annual saving of 15 per cent on expenditures, and an aero-engine manufacturer found savings of the same order of magnitude. In the United States, the pharmaceutical industry operates presently in the metric system, and it is reported that the direct costs of conversion were paid for by savings in operating costs during the course of the first year of metric operation.

To sum up: Canada has recognized in principle that it will eventually become a metric country; there are significant costs and benefits involved in the conversion, but the costs are mostly in the short term while the benefits extend to the longer term; and there may be considerable advantages to moving somewhat more rapidly than the United States towards metric conversion. In Canada we should be studying this matter carefully so that the conversion may take place as smoothly and inexpensively as possible, so that we understand the real costs and benefits involved, and so that we are not unprepared to keep pace (at the very least) with the actions the United States may take in this area. Presumably, this will be one of the concerns of the new Standards Council of Canada.

Notes for Remarks by
Arthur J. R. Smith
to the
Canadian Chemical Producers' Association
Montreal, May 11, 1971

CANADIAN MANUFACTURING ON THE THRESHOLD OF THE 1970'S

The central challenge to Canadian manufacturing in the 1970's is to improve on the performance of the 1960's. That is a tall order. By almost any basic measure, the decade of the 1960's was probably the most outstanding decade in the history of Canadian manufacturing. How are we going to beat this record? In particular, how are we going to achieve this in the face of the many problems and uncertainties that confront Canadian manufacturing today? Yet, I am convinced that we must beat that record, or face serious problems of shortfall from good performance for our economy as a whole.

If this challenge is to be successfully met, there will be an essential need for industry effort and industry initiative. Only a manufacturing industry which can keep itself in good fighting trim will have the capabilities for strong growth in the 1970's. This will call for vitality, quickness, flexibility, a capacity for applying new ideas, bold and daring approaches. It calls for high entrepreneurial skills and the energies of the youthful, whatever the age of those responding to challenges. This challenge also poses key questions for policy -- how to shape an environment that will both support and promote vigorous and enterprising actions by manufacturing decision-makers. The key issue in both fields will be the quality of decision-makers -- and behind this, the development



and application of knowledge in truly innovative ways, building on Canada's economic strengths, and keeping Canadian manufacturing on the frontiers of economic progress.

A vital necessity for adequate progress for manufacturing in the 1970's is that such progress must be fundamentally conditioned upon three key factors. The first is that rapidly expanding markets are the foundation upon which all real progress will rest. We can learn much, here, from the Japanese experience and attainments, which appear increasingly to reflect concentration of industrial effort in those activities in which market growth, both domestic and external, is very rapid -- and which can attract a proportionately rising share of purchasing power as incomes expand. If Canadian manufacturing in the 1970's is to grow rapidly, then a substantial proportion of it must have strong growth of sales and production in high market-growth fields -- that is, in fields where rates of growth are higher than those for total income and production in the economy. This sounds axiomatic and trite. Yet, it is surprising, when one comes to look at the real world -- and at both government and industry policies and decisions -- how much time and effort, and how many policy actions and decisions appear to be focused on: supporting slow-growth situations, propping up declining activities, protecting units in economic troubles by subsidies, concessions, special "incentives" or trade barriers of one kind or another. One of the favourite sayings of economists is that "there is no such thing as a free lunch". Somebody pays! To divert energies and resources to support slow-growing activities inevitably imposes, even if rather indirectly, higher costs on faster-growing



activities, and may well impede and impair the faster-growing potentials of the latter.

A second, and not unrelated, factor essential to strong manufacturing progress -- again, one that can be well illustrated in Japanese industrial policies -- is the essential acceptance of change as the most essential element in growth. Success will depend on the skills with which enterprises can respond, effectively and quickly, to new pressures and opportunities arising from outside sources -- for example, changes in markets and tastes -- as well as to the massive challenges for managing change within enterprises. For example, during the coming decade, there is obviously going to be a need to absorb scientific and technological change on a scale hitherto unknown, to sort out and use what is relevant from a bewildering flood of information, to generate and deploy massive capital resources, to make effective use of the richer manpower resources that will be available, and to adjust and innovate not merely in technical ways but in all aspects of management, financing and marketing. In short, vast changes will be needed. In fact, the output of most manufacturing companies in 1980 will consist of different products than they are producing today, and in most situations in which this is not so, the companies will probably not have grown very much during the 1970's.

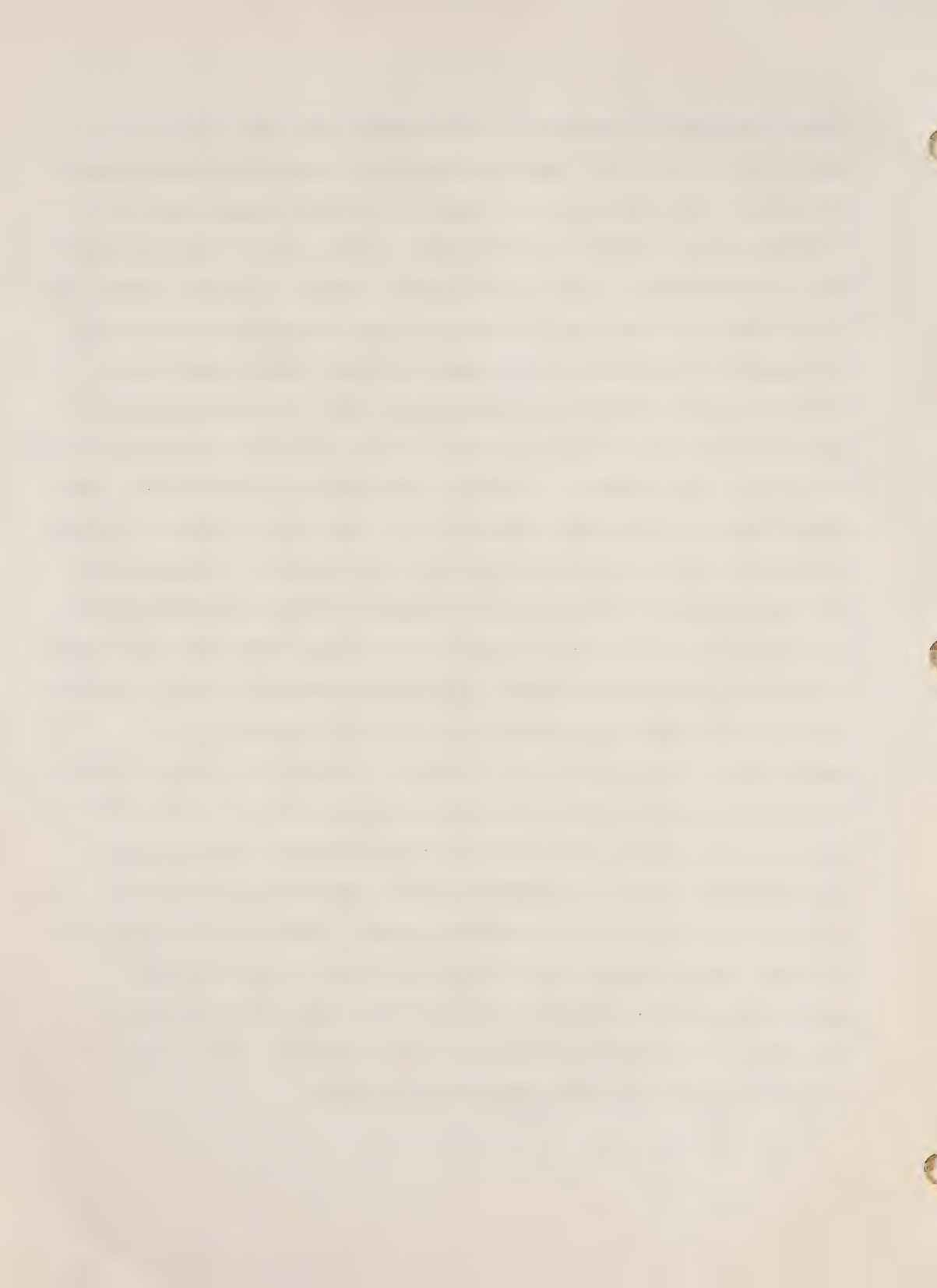
The third key factor essential to manufacturing progress in the 1970's is strong productivity growth. Indeed productivity growth will be the touchstone to success and may well be



more crucial than at any time in the past half century. More simply, this means that productive resources -- knowledge and manpower, capital and other resources -- must be used increasingly efficiently. This is an especially important consideration for those who may not have, or who may be unable to find or develop rapid growth in markets for their products. For without such growth, competitiveness (including price competitiveness) will be harder to maintain; profitability, and hence the capacity to attract capital, may be impaired; wage and salary increases may have to be constrained, and hence the difficulties of recruiting and maintaining managerial, professional, technical and other skills and experience may be greatly accentuated. How to get a larger volume of output for relatively smaller inputs of productive resources is perhaps the most critical of all of the issues that will determine the performance of Canadian manufacturing industries in the coming decade.

These are some of the basic challenges for manufacturing for the 1970's, as I see them. I would like to add a few others later in my remarks. But some of you will already be saying, "All of this sounds very nice, but the fact of the matter is that many important parts of Canadian manufacturing are now in deep trouble." Profits per unit of output in manufacturing are now close to the lowest level since the Great Depression of the 1930's. Markets, especially domestic markets, have been weak. The exchange value of the Canadian dollar has risen and has had significant adverse effects on the international competitive position of most manufacturing industries. Increases in many costs per unit of

output have been substantial -- especially wage and salary costs. Under these conditions, many manufacturing industries have reduced employment, shortened hours of work, curtailed various lines of production and reduced new investment. Also, there are currently many uncertainties -- about the current economic outlook; about the future level of the Canadian exchange rate and external economic developments of various kinds; about whether inflationary cost increases can be effectively moderated; about the implications of rapid technological changes in many fields; and about future policies of Canadian governments -- federal, provincial and municipal. And beyond the more immediate uncertainties, some would claim, are more fundamental ones, stretching out into the future -- proposed tax structure changes that may tend to depress savings and investment at a time when there may be particularly large needs for new capital investment; increased economic nationalism that may tend to depress access to new capital, technology, skills and markets; the possibility of more persistent restraint settings in demand policies if inflation proves to be a more persistent problem in the 1970's; mounting fears about environmental deterioration that may have unpredictable effects on industry; and a spreading controversy about the desirability of economic growth. Against the background of these uncertainties and troubles, how can we look forward confidently and positively to meeting the large new challenges of the 1970's. In partial response to that question, let me turn to look back briefly at the record of the 1960's.



The Achievements of the 1960's

If we had been meeting a decade ago, I suggest that the uncertainties and concerns about the future would have been even greater than they are today. The Canadian economy had been going through several years of poor performance -- with slower growth than in the past few years and higher unemployment, with low profits, with reduced levels of business investment, with a Canadian dollar at a premium over the U.S. dollar for a number of years through 1960 and with even more strained international competitive difficulties (resulting, at that time, in a substantial import surplus, in contrast with our present substantial export surplus). In fact, the share of manufacturing in the total economy had slipped from its strong position in the earlier postwar years, and accounted for a reduced share of total output, employment and capital.

Yet, from this depressing start, Canadian manufacturing a decade ago launched itself into what is clearly its greatest decade of achievement of all time. What happened? The dramatic turn-around in the industry's fortunes was based upon several favourable factors, none of which could have been clearly foreseen in 1960. The declining value of the Canadian dollar in 1961 and 1962 set the stage, followed by the strong recovery in the domestic economy. Exports of manufactured goods were aided by the growing demands in the United States, arising, in part, from the Vietnam hostilities and the space program. The automotive agreement proved to be a powerful factor promoting growth in manufacturing as the 1960's progressed. More generally, buoyant conditions throughout

the industrial countries of the world, coupled with heavy demands for Canadian grains, oil, minerals and forest products, did much to underwrite the overall strength of Canadian manufactures throughout the decade. The share of the manufacturing industries in the national economy rebounded dramatically, from 24 per cent in 1960 to more than 27 per cent of real domestic product -- an exceptionally high proportion by historical standards. This growth was accompanied by a tremendous upsurge in capital investment. At the close of the 1960's capital investment in manufacturing was taking place at a rate more than two-and-one-half times that at the beginning.

The performance of the manufacturing industries through the 1960's was noteworthy for many reasons. Much of the rapid growth took place in the "high technology", capital-intensive segments of industry. These included, of course, important parts of the chemical industry. However, the most extraordinary feature of Canadian manufacturing in the 1960's was its export performance. Exports of manufactured products increased, as a percentage of total exports, from about 12 per cent in 1961 to 40 per cent in 1969. This represented an increase in exports of manufactured products over that period in excess of \$5 billion -- a phenomenal achievement. Contrast this with an increase of manufactured exports of less than \$150 million in the whole of the decade of the 1950's! Even after setting aside the effects of such special factors as the automotive and the defence production-sharing arrangements with the United States and increased foreign aid shipments of manufactures,



manufactured exports rose about ten times as much in the 1960's as in the 1950's. As a result, Canada's balance of trade in manufactures, which historically always had run a substantial deficit, moved closer into balance. For example, exports of "end products", which had been only about one-fifth the volume of imports in 1961, were three-fifths the volume of such imports in 1969.

However, manufacturers in Canada are well aware that the pattern of exports in the 1960's cannot be taken for granted. That performance reflected the full impact of a number of the favourable factors previously noted -- the devaluation of the Canadian dollar, the automotive agreement, defence-sharing arrangements, the space program and the expansion of aircraft sales. Three important features stand out concerning these favourable factors.

First, they could not have been accurately foreseen in 1960. An important feature of any ten-year plan in 1960, therefore, would certainly have been the capacity to keep options open -- to seize unexpected opportunities and re-set perspectives and priorities. The opportunities reflected, to a significant degree, "discontinuities" which were outside the direct control of company executives. What executives did was take advantage of the new opportunities.

Second, the favourable developments required close liaison with government, and the harmonization of business and government policies -- many developments depended in some important way on particular government policies.



Third, the main expansionary impact of these major developments of the 1960's appears to be over. The Canadian dollar has strengthened, the Canadian automobile industry has largely moved into the pattern of North American industrial rationalization of this industry expected from the agreement; hopefully, the Vietnam build-up and, indeed, conflict, is mainly behind us; the space program has been moderated; and the aircraft industry, on a continental basis, is not moving forward at the pace of earlier years.

In total, therefore, the tremendous record of growth and transformation, which set the 1960's as a decade apart for Canadian manufacturing, appeared to draw to a close as the decade ended.

The Outlook Beyond 1970-71

We arrive, then, at 1970-71 with enormous achievements in the 1960's, but with some disturbing questions about the 1970's. Confronted with these problems and questions, can Canadian manufacturers repeat in the 1970's the outstanding performance of the 1960's?

The answer, of course, is, "It all depends." Let me very briefly seek to set certain key issues in perspective.

The first is that the underlying economic growth potentials both in Canada and in its major trading partners are larger in the 1970's than in the 1960's. For the 1960's, the Organization for Economic Co-operation and Development set a target of a 50 per cent growth in the total combined volume of output of its 22 member countries. This target was in



fact exceeded. The growth was actually 55 per cent. For the 1970's, this Organization, after careful consultation with all members, has set a target of 65 per cent growth in output. In Canada's case, the anticipated growth is about 70 per cent for the 1970's, compared with an actual growth of about 65 per cent in the 1960's. Similarly, for our most important trading partner, the anticipated growth for this decade is close to 60 per cent, compared with about 50 per cent for the past decade. Thus, if we and the other members of the OECD measure up well with the growth potentials, there will be a highly favourable background setting for the growth of Canadian manufacturing. And in this context, I would emphasize particularly that decision-makers should take special care not to extrapolate the slower growth of the past year or so in North America through the 1970's. Anybody who does so is bound to be wrong. Such an extrapolation would imply that by 1980, Canada would have a higher unemployment rate (over 20 per cent) than in the depths of the Great Depression in 1933.

Second, given that there are large potentials for market growth in the 1970's in Canada and in the international arena, and that rapid actual growth will undoubtedly occur, the next key question is: "Can Canadian manufacturers get good access to these expanding markets?" The answer depends on two critical factors. One is the external situation, including the course of international trade policies, of international monetary conditions, and of the combined efforts of Canadian business and governments to press for, and to take advantage of, new opportunities for expanding exports of manufactures. The other is the productivity performance of Canadian manufacturers in

relation to their counterparts abroad. This, too, will depend on the combined efforts of governments and industry to promote strong and sustained productivity gains.

In our work at the Economic Council, we have just started to look more closely at structural changes in the Canadian economy. Our last Annual Review was mainly devoted to a retrospective view of this nation's changing industrial structure over the past two decades, with particular attention focused on the dimensions and nature of productivity growth. In our future work -- in particular, for our Ninth Annual Review next year -- we hope to be able to make a beginning towards looking at future growth potentials by major sectors of the economy, including manufacturing. Thus, we are not yet in a position to be able to develop a soundly based and comprehensive industrial policy strategy for Canada. But, some of the key elements for such a strategy have emerged from our earlier work in a number of fields. Among these are the following, which I will summarize briefly in four points:

- (1) First, scale and specialization are critically important for high productivity growth in Canadian manufacturing. In most cases, specialization -- that is, longer production runs of relatively few products -- may be more important than size of plants or large-scale corporate organization. Thus, in many fields (as is amply demonstrated in U.S. as well as Canadian experience), small and highly specialized units can operate with high degrees of profitability and success. A study for the Royal Commission on Money and Banking, for example, revealed that among companies making profits in Canada, profitability was twice as high among small companies than among large companies. But in other cases -- and this appears to be especially true of some parts of the chemical industry -- scale of plant may be of vital importance for efficiency, especially on the basis of newer technology. And in still other cases, large-scale corporate size may be important. In today's world, we are seeing a growing number of very large corporations that no longer fit comfortably into industrial classifications, or even into national boundaries.

Many of them are growing with striking speed and vigour, based upon high efficiencies in mobilizing and using knowledge and productive resources, and upon high degrees of effectiveness in developing growing internationalization of markets. More and more, some of these entities are coming to have a life of their own. An increasing number of them are coming to exceed, in economic dimensions, the size of governments or even whole sovereign states. We have the seeming paradox of giants growing in a shrinking world. It is, of course, no paradox, the giants are helping to shrink the world. Our approach at the Economic Council has been to favour neither "big" nor "small" entities. Rather, it has been to favour policies that will promote efficient entities, whether big or small. This was the central premise in our approach to competition policy for Canada. This has been a central factor in our approach to commercial policy questions. And this has been a key element in the admittedly still very limited range of views we have expressed about business organization and management questions.

- (2) A second vital feature of any appropriate industrial strategy for Canada is that we must be good at applying technology. This is the main premise on which our recent Report on Intellectual and Industrial Property was based. This was also the main premise underlying the Chapter on "Science, Technology and the Economy" in our Fifth Annual Review. This is not just a matter of R and D. Indeed, this mostly concerns actions beyond R and D in the innovation process. In many cases, it is not so much the development or application of new technology that we most need in Canadian industry, it is more the application of existing technology (already available either here or abroad) -- in short, steps to introduce "best practice". And as far as government is concerned, what is most needed, in my judgment, is not increased government involvement (especially financial involvement) in the later stages of innovation -- but rather, more attention to the provision of a basic economic climate and environment which reduces inhibiting uncertainties, encourages risk-taking, and provides the conditions in which entrepreneurial initiatives can thrive.
- (3) Third, there is a vital need for finding effective ways to build on our economic strengths in Canada. In the preceding point, I have already implied that knowledge will be the most important of all. But there are also others. In some manufacturing fields, our resources will give us essential strengths, providing that we keep industrial materials prices relatively low. In others, the rising quality and skills of manpower will be decisive, and it is of crucial importance for manufacturing firms now to undertake a thorough review and revision of their manpower recruiting and deployment practices in the light of the vastly richer manpower resources now becoming

available in Canada in the 1970's. Of all areas of corporate planning, manpower planning (including management development) appears to be generally the least well developed -- far less developed, for example, than investment planning, financial planning, market planning or perhaps even technological planning.

- (4) Fourth, there are the whole range of questions and issues about how to achieve and maintain strong, stable and widely-shared economic growth. We simply will not be able to achieve and sustain strong growth in manufacturing in the 1970's in a "stop-go" economy. Commenting on this matter a year ago, an OECD report stated:

"Stop-go cycles ... have obvious undesirable consequences. They are liable to be self-perpetuating. They make the intelligent forward planning of productive investment more difficult. The fluctuating pressures in the labour market are bad for industrial relations, and inhibit the development of effective methods of wage and salary determination. They also have the effect of diverting the attention of policymakers from the longer-term objectives of economic and social policies. Indeed, the effect of stabilization programmes has frequently been to make the orderly development and implementation of longer-term plans much more difficult."

Since the inception of the Council's work we have placed a high priority on developing analysis and ideas about how, at least within the constraints that may be imposed on us from abroad, Canada could develop new emphases in policies, and a much broader range of policies -- both government and private -- to steer the Canadian economy forward more smoothly in line with its rapidly growing potential output capabilities.

Now let me turn, very briefly, to two other broad topics, "industry and government" and "industry and society".

Industry and Government

Industry and government, of course, often have worked together whenever an industry was in serious difficulty. In recent years, moreover, new joint efforts have been made to remove road-blocks from the path of some high performance, or potentially high performance, industries. These attempts to "reinforce success"

will become increasingly necessary as the size and complexity of economic activities increase. However, government policies, like business policies, often have great difficulty in keeping up with the pace of change.

There are immense problems of harmonizing government policies, even at the federal level alone. Most policies serve a conglomerate of objectives, and the priorities often are sensitive to short-term considerations and pressures. Commercial policy, fiscal and monetary policies, resource development policies, competition and consumer policies, welfare policies, regional and manpower policies all serve other ends than simply industrial development. At times -- and perhaps this is such a time -- industry might feel that matters of national importance, in terms of the survival and growth of strategic segments of industry, are being overwhelmed by the other priorities. The compartmental approach by various government departments, and by the different levels of government, may also seem to create unnecessary confusion and contradiction in government policies.

A number of spokesmen for the manufacturing industries have expressed such concern in recent months, especially in the face of plant closures, cancellation of proposed plant expansion, and the lay-off of skilled manpower, including many research scientists. In this regard, two things are essential on the industry side. The first is to marshall better industrial information and analysis, and to present these more cogently and effectively to governments and in the public arena. The second is to develop new initiatives for more consistent and more

forward-looking joint policies between industry and government. For this, too, industry initiative and effort are essential. This growing need for close liaison between industry and government to develop integrated policies is an essential item on the agenda for the 1970's.

Industry and Society

Finally, what about industry's relationships with the environment in which it operates -- both physical and social?

Environmental and ecological concern is mounting rapidly for reasons associated, in the last analysis, with survival of the human species and other forms of life. This concern is an important area where economic growth and social betterment appear to be on a collision course.

The chemical industry over the years has faced many difficulties in relation to the physical environment. Fertilizers, pesticides, detergents, many of the basic industrial chemicals, some of the drugs and pharmaceutical products, paints, dyes, food additives, some resin and plastic products, and some of the materials and the processes used in chemical production have all been involved in major environmental issues. The list covers almost the entire spectrum of the chemical industry.

The technical and the financial difficulties in coming up with solutions are immense. However, new product and process developments to deal with the environmental problems ultimately will offer new market opportunities. In this context, innovative efforts will pay off in the market place as well as in terms of the improved life capability of the planet.

The industrial-social confrontation, therefore, can develop into a new socio-technological relationship illustrative of precisely the kind of change in our economic and social affairs which we must expect in the decade ahead and the years beyond that. Clark C. Abt has summed it up by saying, "The social efficiency of a technology is its effectiveness in responding to public needs and demands."

There are, however, many other forms of social concern, protest and dissatisfaction. Some of these touch upon health, education, crime, politics, poverty, housing, population, and how these affect work habits and business objectives. I cannot go into these issues tonight except to observe that anyone standing on the threshold of the 1970's could well regard them as the most important factors to be reckoned with as the decade advances.

One feature, however, is so fundamental to the progress of business and society that it does require special mention. It concerns the attitudes, motivations, the education and skills of young people. Close to half of our population is now under 25 years of age. Young executives and young workers are increasingly going to become the main operational force in business and in all institutions of the country. Their potential for expanding the economic life of the country and its social betterment is far greater than at any time in history. It would be a major tragedy if this potential were, to any substantial degree, lost or frustrated.

For the business organization, this issue of the young signifies an additional need for leadership, for zest, for innovation, for imagination and flexibility, both within the business organization

and in its contacts with the community at large. This leadership in drawing young people into constructive effort has often come naturally in the past from the business community, once the need is recognized and the objectives and strategies are laid out. No other endeavour could be more rewarding to a company or an industry both in terms of establishing its competitive strength and in terms of fulfilling a singularly important social commitment.

As we move, then, into the 1970's, many of the problems will seem to have multiplied and the opportunities to have diminished. In some respects, business managers may feel that all these events are moving beyond them, not only beyond their control but moving in ways hostile to traditional business methods and objectives. To what extent is such a feeling justified? What can be done to ensure that business is not just fighting rear-guard actions but is in the forefront of progress over the coming decade?

I have suggested that, a decade ago, the manufacturing industries moved into the 1960's in the face of an even less promising economic climate. Through that decade, Canadian manufacturing turned in an outstanding performance. Perhaps, on the threshold of the 1970's, the economic slack is itself less worrisome than the feeling of uncertainty and confusion regarding the future. However, it is possible to be overwhelmed by uncertainties and the prospect of discontinuities.

Uncertainties and even discontinuities can be overcome by information, know-how and concerted, persistent action, especially when that can be carried on in harmony with the goals and priorities of others. And I would like to take this occasion to express confidence that when, in 1980, we look back on the 1970's, we will have a wide basis for satisfaction that the 1970's will have been a decade of great further progress and maturing of Canadian manufacturing.

Notes for Remarks by
Arthur J. R. Smith
to 41st Annual Meeting of the
Canadian Institute of Steel Construction
Seigniory Club, May 15, 1971

CHALLENGES AND OPPORTUNITIES
FOR THE CONSTRUCTION INDUSTRY IN THE 1970'S

Canada has a particularly construction-intensive economy. Including all its parts, it is one of the largest industries in this country -- perhaps second only to education. In normal years, expenditures of new construction in Canada account for more than \$1 out of every \$7 in Gross National Product -- a significantly higher ratio than exists in the United States and in most other industrially advanced countries. Because of its importance, the Economic Council of Canada has focused special attention on the problems and potentials of this industry since the inception of the Council's work in 1964. And in our future work, we will be continuing to stress the vital need for achieving and maintaining good performance in construction. Without such performance, it will be difficult, if not impossible, to sustain strong, stable and widely shared growth in this nation.

In this context, I very much welcome the invitation to come and play a small part in this 41st Annual Meeting of the Canadian Institute of Steel Construction, and I propose to focus attention briefly on a few aspects of the challenges and opportunities for the construction industry in the 1970's.



The central importance of construction is, of course, not a new feature of the Canadian economy. Throughout our history, construction has been a major activity. Indeed, I think that it is highly appropriate that both in this country and throughout the world, the earliest of all of our skilled construction specialists -- the beaver -- should be recognized as a symbol of Canada. Early Canadians, moving into a largely empty wilderness -- a land of vast geographical size, a land of relatively harsh climate, a land of formidable barriers and impediments to nation-building -- were faced with enormous challenges and problems of many kinds. None were greater than those in the field of construction. Accommodation for a rapidly rising population; fortifications for defence; ports and canals, and later the prodigious feats of national railroad construction -- and through succeeding generations, the swift growth of our cities, the development of vast new bases for transportation (especially for road, air and pipeline transportation); huge new energy, utility and resource projects; accelerated capital-intensity of manufacturing, agriculture, communications, and other industries; and the rapidly developing needs for institutional structures for government, education, and health care -- all of these have had profound implications for the construction industry in Canada. To a considerable extent, the industry today is still greatly influenced by some of these basic factors in the Canadian environment -- distance and climate, rapid urbanization and large-scale transportation, a construction-intensive industrial structure and construction-intensive social capital requirements.



Moreover, on the basis of the Economic Council's analysis, the Canadian economy today stands on the threshold of a decade which appears to contain the most rapidly rising growth potentials of any decade in well over half a century. The significance of the construction industry is therefore likely to increase rather than decrease in the years ahead. And it is vitally important -- not only for you in this industry, but for all parts of our economy, and for all Canadians -- to develop highly effective means for meeting the major new construction challenges and needs of the 1970's.

Recently, construction and many construction-related activities, along with many other parts of the economy, have been going through a time of uncertainties and troubles -- in fact, perhaps greater difficulties than most other parts of our economy. Paid male employment in construction has declined by 30,000 persons from 1966 to 1970. Productive capacity in many parts of the industry appears to have declined. Profits have been generally low and losses have been experienced by many organizations. With weaker demand for some types of construction, it has been more difficult for many units to acquire and maintain modern, technologically advanced and highly efficient machinery and equipment. Instabilities have tended to impede strong productivity growth. Labour-management problems have been serious and widespread. Rapidly rising costs and prices in this sector of the economy have continued to be a major cause for concern. In short, not only has the slowing down of the whole economy tended to impose problems on construction and construction-related activities, but instabilities in this sector of the economy have aggravated other problems elsewhere in the economy.

Underlying most of these problems is a fundamental difficulty with regard to construction that is now coming to be known as the "surging problem". When one looks back over the total expenditures on construction in constant dollars over the last two decades, one can see clearly that virtually all of the expansion in the volume of construction in this period has been concentrated in two very short surges of expansion. From 1954 to 1957, we had an increase of over 40 per cent in the volume of construction. Then we had virtual stability in construction expenditures for a period of about six years, to be followed by another huge surge in construction of 30 per cent within the three years 1963 to 1966. Since then, again, the volume of construction expenditures has been fairly flat over the past four years. It is imperative that we find effective means to prevent this sort of surging problem in the future.

One of the obvious requirements is that we must achieve more stable and steady growth in the economy as a whole, and avoid "stop-go" cycles in our national economy in the future. A year ago, the Organization for Economic Co-operation and Development examined the performance of its 22 member countries (including Canada), and concluded that during the 1960's, while major recessions and uncontrolled inflation had been avoided, "the growth of demand in output has nevertheless been uncomfortably uneven, periods of rapid expansion alternating with periods when output was stagnant or falling". Commenting further on this pattern of economic trends, the OECD said:

"Stop-go cycles of this kind have obvious undesirable consequences. They are liable to be self-perpetuating. They make the intelligent forward-planning of productive investment more difficult. The fluctuating pressures on the labour market are bad for industrial relations, and inhibit the development of effective methods of wage and salary determination. They also have the effect of diverting the attention of policy-makers from the longer-term objectives of economic and social policy. Indeed, the effect of stabilization programs has frequently been to make the orderly development and implementation of longer-term plans much more difficult."

A prominent feature of the broader instabilities in the Canadian economy have been the sharp changes in construction expenditures, both by governments and by private sectors of the economy. Moreover, while there had been great hopes in the early postwar period that governments might be able to act effectively to counter instabilities in construction expenditures in the private sectors of the economy -- by cutting back on government construction when private expenditures were rising strongly, and by adding to government construction when private expenditures were weak -- the fact of the matter is that there has been a strong tendency for both private and government construction expenditures to rise strongly at the same time in the periods of strong construction surges in the 1950's and 1960's, and for government construction expenditures to be relatively weak when private construction expenditures were weak. Thus, governments appear, if anything, to have aggravated the construction instabilities rather than to have moderated them.

This is an extremely important matter, for governments, taken together, account for a substantial part of total construction in Canada -- perhaps around a third or more -- and indirectly influence a significant additional proportion of construction expenditures in



the private sectors. It should be explicitly recognized, of course, that the federal government is not directly a large factor in construction expenditures (accounting for only about 5 or 6 per cent of all construction expenditures in Canada). But it is clear that there is a need for improved forward planning and co-ordination of construction projects by all levels of government -- federal, provincial and municipal -- as well as in the private sectors. In this context, I read with interest in the report of the Conference Board Symposium on Construction last January the remarks of Mr. G. B. Williams, senior deputy-minister of the federal Department of Public Works:

"The fundamental solution to the surging problem lies in a continuing improvement in co-ordinated planning. Within individual government programs, functional planning can be developed on a long-range basis, so that the construction element can be phased in on an orderly basis. Among levels of government, co-ordinated planning can also be developed to achieve the same end."

In this same context, the Economic Council has explicitly encouraged business firms to undertake more effective medium-term investment planning to achieve a steadier growth in their construction, and more generally their capital investment expenditures. I am fully aware that at times such as the present, when there is uncertainty over many matters -- matters such as tax reform, changes in international competitive conditions, very slow growth in domestic demand, and various financial changes -- major difficulties arise for private corporations in laying plans very far forward. But I think that it is extremely important for businessmen to be aware of the fact that the lack of careful planning leading to smoother and steadier growth in their investment expenditures can be very costly, not only to the economy as a whole, but to the individual firms themselves.

This is a matter that, in my judgment, requires urgent attention now. The Canadian economy is currently operating somewhere in the range of 3 to 4 per cent below potential output and is looking forward to a decade in which the average annual rate of growth in potential real output will be slightly above 5 per cent. Thus the underlying possibilities for growth of the Canadian economy during the coming decade are very large, reflecting especially the rapid growth of the Canadian labour force. Once recovery from the current economic slowdown moves into higher gear, the basis will exist for a relatively high rate of growth in the economy for a number of years into the future. Hence, in order to provide adequate production facilities, and at the same time to avoid a repetition of the earlier surges in new capital investment with their accompanying costly distortions and pressures and strains on resources, many organizations should now be reviewing their capital investment intentions in relation to the medium-term prospects of the economy moving up towards a rapidly growing level of potential output.

This need for such reviews is reinforced, moreover, by the Economic Council's medium-term capital survey last fall. This survey indicated that the outlook for capital investment, particularly in the business sector, was the weakest shown in all such surveys the Council has made. The weaknesses were particularly pronounced in the medium term for construction expenditures. It was with some of these considerations in mind, that the Economic Council in its Performance Report last September, made the following recommendation:

"... it appears that industry, unions, and governments, are not working well together to solve critical problems. Construction is a major activity in all regions of Canada. In this case, more seems to be required than the shift towards steady growth policies that we have endorsed in the past and continue to emphasize in this Report. We therefore recommend a careful inquiry -- in the light of various provincial responsibilities in this field, one which should appropriately be established on the basis of federal-provincial consultation -- into means of getting better solutions for the many intractable problems that are now plaguing this sector of the economy."

Some of you will perhaps have heard me draw this recommendation to the attention of the Construction Industry Development Council last January. But to the best of my knowledge, no definite action has yet been taken either in government or in the construction industry to promote the undertaking of such a study. I would like to take advantage of this opportunity to suggest to the members of the Institute of Steel Construction that they consider whether it might not be appropriate for them to take some explicit decision to support such a project.

I believe that the Construction Industry Development Council is, in fact, considering launching a study of instability problems in the construction industry. Moreover, I understand that the Prices and Incomes Commission is undertaking a study of some aspects of the troubled industrial relations situation, and of the persistently high price and cost increases, in this industry. There have also been other initiatives such as the very useful review of the Canadian construction outlook undertaken by the Conference Board to which I referred earlier. But commendable as all of these moves are in themselves, there is a possibility that they may lead to fragmented and not fully consistent

assessments of the industry and its problems; and I believe that the need still remains for a more comprehensive and a more intensive examination of the industry and its problems through a more broadly based inquiry.

The central challenge for the 1970's is therefore the challenge of achieving a smoother and steadier trend of growth in construction expenditures. To this, all other challenges are subsidiary. Moreover, the importance of this challenge can be put into very sharp focus at the present time by considering the fact that the total growth of construction expenditures in the Canadian economy in the 1970's should be rising more rapidly than the total growth of the whole economy. At the present time, actual output in the Canadian economy is perhaps in the range of 3 to 4 per cent below potential output -- that is, below where the economy ought to be if it were moving forward on a trend-line reflecting relatively full and increasingly efficient use of its productive resources. While there is no very good measure of the comparable gap between actual construction expenditures and the levels that would correspond with an economy growing at close to its potential rate of growth, in rough terms, construction expenditures are probably now of the order of 9 to 10 per cent below their appropriate potential growth path. Or, to put it another way, total construction expenditures are perhaps now of the order of \$1 billion below the level which it would be appropriate for them to be at in a reasonably fully employed, productively expanding Canadian economy.

On the basis of increasing evidence that the economy is turning around and heading for a period of considerable growth, there is thus urgency in addressing ourselves to the danger of a major new disequilibrium of a kind that existed a decade ago, with a disturbing implication that another huge, distorted construction boom may be in prospect before the mid-1970's. One of the areas in which this challenge needs to be addressed most urgently at the present time is in fact within the construction industry itself, so that this industry can be in a relatively much stronger state than was the case in 1963 to accommodate an almost inevitable large expansion in construction demand as effectively and as efficiently as possible.

I believe that the opportunities for gain from steadier growth of construction activities are very large indeed. Not only would the entire economy benefit greatly from this, but the industry and its various components parts, such as yours, could also expect to achieve stronger productivity growth, more stable costs and prices, improved labour relations and enhanced profits.

Let me turn now for a few moments to another challenge. I have been particularly pleased to learn that the Construction Industry Development Council has established a committee on construction management education, which the President of this Institute, Mr. Johnston, will chair. As you may know, the Economic Council has recently published the results of a study conducted on the practices in use in a group of Canadian companies for the planning and development of their requirements for management and professional personnel.

While I believe there is a good deal in the study that merits your reading it in its entirety, the gist of our findings was that only about 10 per cent of the companies we surveyed were using systematic, integrated programs for manpower planning and development, and that there was a considerable gap between what might be regarded as "best practice" and the average practice in actual use. On the basis of these results, it seems clear that the manpower procedures in general use need to be improved considerably if companies are to be in a position to take full advantage of the various opportunities that lie ahead and indeed if companies are to ensure their own long-term survival.

The coming decade will be one of large and rapid changes. Such changes are a central feature of rapid economic growth. Your industry will be in the very middle of many of these changes, and will be greatly affected by many of them. Within the industry you will be confronted by needs for major technological changes, new methods and new materials, as well as substantial alterations in the size and types of organizations that will represent the industry. In these circumstances, with major changes taking place both outside and within the construction industry, construction executives, if they are to effectively represent the interests of the industry and cope with new challenges and opportunities, will require an increasing familiarity with broad social and economic issues, as well as with the particular affairs of their own companies. Many of these changes and developments are likely to require new and different types of management skills which can only be provided if needs are identified in advance and steps taken, such as training and development, to meet these needs.

There is much expertise in the construction industry that could be harnessed to broad social and environmental issues. Your industry perhaps recognizes more than most that man in the future will largely live increasingly within a man-made environment, mainly in our cities. We therefore face fundamental new needs and problems associated with urban growth, with pollution abatement, with the development of much more adequate recreational and cultural facilities. We should now be giving much more attention to these important issues in a much more socially conscious society, with much greater attention to the question of how we can best provide esthetically pleasing, less congested, clean, and culturally satisfying conditions for human life.

Notes for a speech
by Dr. André Raynauld, Chairman,
Economic Council of Canada,
to the Conference Board,
Montreal, October 26, 1972

TECHNOLOGICAL FORECASTING

(Translation)

1. Introduction

To declare, nowadays, that better knowledge of the nature of technological change has become a must is a truism.

First of all, the rapid increase in research and development expenditures in the public and private sectors is one of the most significant developments since the Second World War. According to the Lamontagne Report,⁽¹⁾ national expenditures for research and development have increased at an annual rate of about 15 per cent during the 1963-69 period, and totalled about \$1 billion in 1969.

Second, the quality of technological performance has become a determining factor of the competitive capacity of businesses. And new technical capacities and new economic institutions are often required to solve the numerous problems facing governments in the areas of transportation, communication, education, health, environment and many others.

Third, activities that generate technical progress seem also to generate profits. By most recent measures, their average social rate of return exceeds 13 per cent, and their private rate of return, that is, only that attributable to decisions of private firms, exceeds 18 per cent.⁽²⁾

Fourth, while I would stress the difficulty of measuring the contribution of technological progress, with any precision,⁽³⁾ we can say that technology represents a determining factor in the growth of an economy.

Finally, technological change is the best basis for forecasting the future. The reason is that there is a sufficiently long period between the conception of an idea and its diffusion through the social system, in the form of new products, services, procedures, or institutions, that its implications can be described in advance, and thus its execution can be oriented according to the will and desire of the people of today.

Granted that it is highly desirable that public authorities and businesses adopt a much more distant horizon for action than they usually do, technological forecasting is a most useful instrument that should be used on a very wide scale.

The methodology of technological forecasting is still in its infancy. It is incomplete, and most of its basic concepts have not yet been tested. According to Professor James R. Bright, ⁽⁴⁾ from Texas University, technological forecasting is now at the same point of development as economic forecasting 50 years ago. His remark is at once disquieting and full of promise.

It is disquieting if we recall the state of confusion prevalent around the year 1930 concerning macroeconomic policies. In the midst of controversy about the usefulness of the public works advocated by Keynes, Professor Hayek, of the Austrian school, was invited to Cambridge to present his views. He succeeded in showing, through an error that confused investment flow with capital stock, that unemployment was the result of consumption. The leading lady in our profession, Mrs. Joan Robinson, who participated in this meeting, reports this significant episode: ⁽⁵⁾

"R. F. Kahn, who was at the time involved in explaining that the multiplier guaranteed that saving equals investment, asked in a puzzled tone, 'Is it your view that if I went out tomorrow and bought a new overcoat, that would increase unemployment?' 'Yes', said Hayek, pointing to his triangles on the board, 'but it would take a very long mathematical argument to explain why'."

At the same time, Professor Bright's remark is quite promising, because economic analysis now has a sound methodological basis. There are still some problems, but it must be recognized that since the last World War, economic analysis has enabled governments to implement policies that have prevented major imbalances in the economy and have led us to an era of affluence.

There is no doubt that technological change is one of the major forces affecting our long-term future. Therefore, we must not submit passively to this future; we must learn to anticipate it by improving our methods. Our understanding is much deeper than it was even recently, and systematic use of technological forecasting has greatly increased. For this discipline to evolve along the same lines as economics, it is necessary, for example, to build testable models and to develop relevant statistical series.

In spite of the inherent difficulties in forecasting the nature of technological change, the information it provides is an essential prerequisite for business and government decision-making processes. Indeed, although technological forecasting is

not always obvious, it is implicit in many decisions. Therefore, the improvement and dissemination of technological forecasting methods would be conducive to better decisions.

As is obvious from the foregoing, my subject today is technological forecasting. First I shall briefly discuss its definition and related conceptual approaches, and then review certain methods of technological forecasting and their uses in practice. After that, I will go on to tell you about some preliminary results from a survey undertaken by the Economic Council on long-term research in Canada.

2. Definition of conceptual approaches

According to Erich Jantsch,⁽⁶⁾ "Technology denotes the broad area of purposeful application of the contents of the physical, life and behavioural sciences". This definition covers almost all deliberate human activities. Despite its broad nature, it is widely accepted, and we can therefore use it for the purposes of these reflections.

On the other hand, with respect to the definition of technological forecasting, opinions are in conflict. In fact, a review of the literature in this field shows that authors are in disagreement on aspects as important as the definition of technological forecasting, its usefulness and its relationship to long-term planning. However, if a certain degree of consensus does exist, it is on the fact that technological forecasting is an art that is gradually becoming a science and that its use is difficult.⁽⁷⁾

For me, the most satisfactory definition is provided by Marvin J. Cetron: (8) technological forecasting is "a probabilistic assessment of the emergence of a technological accomplishment within a given period and with the contribution of a given quantity of resources".

As for the approaches used in technological forecasting, we can distinguish two categories: exploratory and normative. (9)

Exploratory forecasting implies that technological change is above all a scientific phenomenon with its own dynamism. It results from technical or other discoveries, defined in terms of accrued knowledge and knowledge to be acquired. Therefore, such a technological change has no link whatsoever with social or economic reality. One "explores", scientifically, and ends up by finding something. Forecasts made according to this approach are therefore based upon the internal logic of the development of an idea or of a scientific technique.

Among economists, one can find a confirmation of this way of thinking in Schumpeter who made a rigid distinction between invention and innovation, invention being the scientific phenomenon and innovation the economic phenomenon. Until fairly recently, economists have respected this distinction by considering technological change as an exogenous variable, that is, an external element of economic analysis.

In contrast, it is agreed to call normative forecasting, even though the expression leads to some confusion, that which makes technological change an economic process that fulfils clearly identified needs. In this context, technological forecasting consists of determining and defining future needs, and then showing the technological barriers to be eliminated to satisfy these needs. In other words, technological change follows economic laws; it comes about when some particular economic conditions are met, such as the profitability, the size and structure of the potential market, the availability and cost of financial resources, the state of competition, and so on. Invention and innovation simply become two steps in a one and the same process of production of knowledge.

We must note here that technological change thus characterized is likely to upset the mechanisms of the market we know today because, to the extent that it may involve indivisibilities, externalities, and uncertainty, it is more likely to be initiated by the public sector than by private competitive enterprise.

Be this as it may, I will now review some practical methods of forecasting based on either one of the two general approaches of the normative, or exploratory, type.

3. Some Forecasting Methods and Examples of Utilization

My intention is to describe a few methods and to point out examples obtained mostly from information gathered during our survey. I shall deliberately be brief, hoping to earn the leniency of those already familiar with these methods.

3.1 Intuitive Methods

Intuitive methods are based on the opinions of experts, and may take several forms: individual reports, surveys, panels, and the Delphi method.

The Delphi method, developed by the Rand Corporation,⁽¹⁰⁾ is a systematic approach to reaching a consensus among experts through a procedure based on a series of questionnaires and answers. It allows each participant to revise his estimates in the light of the opinions and arguments of others without direct confrontation.

For instance, a Canadian company did a study not too long ago on the future of medical technology, using the Delphi method. A group of 36 specialists in various fields gave their opinions on various issues covering several periods up to the year 2000. The results of the study were used to establish the market strategy of the company concerned. In another area, the Delphi method served as a basis for a study entitled "Social Futures: Alberta 1970-2005", by the Human Resources Research Council of Alberta.



3.2 Extrapolation of the Trends

Trend extrapolation methods describe the time path of certain technological phenomena or variables. Conceptually, there are two different approaches: (a) a measure of the increase in performance of a given technology, and (b) a measure of the substitution rate of one technology by another over time.⁽¹¹⁾

The widespread use of this method of technological forecasting is attributable much more to its convenience than to its forecasting capacity. One firm has used it in Canada to project the size of hydroelectric generators and pump turbines over a period of 20 years. In a study entitled "Canada 2000", a firm of consultants has projected historical trends in such fields as population, transportation, and housing.

A refinement to the extrapolation of the performance of a technology has been the adoption of envelope curves, which take into account the fact that functional needs (transport, lighting, and so on) can be met over time through the use of different technologies. The envelope curve is a curve which is tangent to a family of curves describing the increase in performance of various technologies serving the same functional need.⁽¹²⁾

When measuring the substitution rate of one technology by another, the past substitution rate is used to determine when future changes will occur.⁽¹³⁾ For example, a telephone company has made forecasts on the substitution between assisted and automatic long-distance calls.

3.3 The Morphological Analysis

The morphological analysis is a method used to identify, and measure in mathematical terms for all possible ways and means for attaining a specific functional capacity.⁽¹⁴⁾ It enables us to analyse new technological opportunities, to calculate the probability of inventions, and to generate scenarios by systematically combining historical events.

This latter use is the most common, for the other two imply serious technical problems. For instance, within the framework of a study on the growth potential of a politically unstable country, one firm has developed alternative futures by means of scenarios generated by a morphological analysis.

3.4 The Scenario

A scenario is a logical and plausible sequence of simultaneous or lagged events, set up in order to draw attention on causal relationships and decision issues.⁽¹⁵⁾ With this method, it is possible to analyse the causes of a given situation as well as the alternatives available at each step for preventing, correcting or facilitating a certain event.

For example, a public utility has prepared a study on the long-term future as a basis for developing its management strategy. The study results were presented in three scenarios representing pessimistic, neutral, and optimistic positions.

3.5 Cross Impact Matrices

Cross impact matrices⁽¹⁶⁾ are an iterative method dealing with existing interdependencies between future events: the occurrence (or non-occurrence) of a future event can increase, reduce or not affect at all the probability that another future event will occur or not. With this method it is possible therefore to combine independent forecasts within a scenario composed of interdependent events.

This method was used by Bell Canada to evaluate the social impact of computer-programmed teaching.

3.6 The Dynamic Forecasting Model

The dynamic forecasting model⁽¹⁷⁾ associated with the name of Jay Forrester is a method used to study the development of a system on the basis of the existing relationships between its components. By analogy with econometric models, it is thus possible to examine both the conditions of demand for and need of technological innovations, and the conditions of supply, that is, the capacity of existing or future technologies.

The difficulties in applying this method are serious because it requires a good understanding of factors affecting the development of the technology examined. Perhaps this explains the fact that we were unable to find any firm in Canada using that method.

This enumeration of methods and examples of use is obviously not exhaustive.

4. Some Indications of the Degree of Dissemination in Canada

Most of the work of the Economic Council has, in the past, dealt with short-term objectives and the potential of the Canadian economy. The Ninth Annual Review, which will be published next month, covers a somewhat longer period than usual and describes the outlook for the Canadian economy in the 1970s.

Having decided to extend its forecasting horizon and to explore the feasibility of a systematic analysis of the long-term future, the Council, as a first step, decided to gather information from the private sector, government agencies and the academic community on the projects undertaken and the techniques used in that area. Although it addressed itself to the somewhat larger field of long-term forecasting, the survey that is still underway provides some data on the uses of technological forecasting in Canada.

In the private sector, 140 companies are participating in the survey. With only a few exceptions, this group is made up of firms selected from those covered by the survey of the Council and the Department of Industry and Commerce on investment intentions. Of these 140 companies, 48 have not yet replied to our offer of participation, and in 10, work is still under way. Among the 82 companies for which the survey has been completed, 16 per cent are carrying out long-term studies while 84 per cent are not.

Out of the 39 federal government agencies that are part of the survey, 10 did not reply and, in eight of them, work is in progress. Among the 21 agencies for which the survey is completed, 38 per cent are making long-term analyses while 62 per cent are not.

As for provincial and municipal governments, eight organizations are surveyed, and in two cases work is in progress. Of the six organizations for which the survey is completed, 67 per cent are carrying out long-term studies while 33 per cent are not.

With respect to the academic community, there was no systematic sampling done. According to the incomplete information we have, no formal research centres in the field of long-term analysis seem to exist, and teaching in this area seems very limited.

The preliminary results of the survey seem to indicate that technological forecasting is more widespread in the public than in the private sector, and that the academic community does not seem much interested in that field. In spite of some practice in the field of technological forecasting, we are obviously at an initial stage, because examples of useful uses are limited. However, the evidence received from people contacted personally by our staff in approximately 70 organizations or companies suggest a growing interest in technological forecasting and its various practical applications.

5. Conclusion

In concluding this general outline of the state of knowledge and the diffusion of technological forecasting, I wish to stress the following points:

1. The construction of testable models and the development of relevant statistical series should lead to badly needed improvements in technological forecasting.
2. While recognizing its shortfalls, one can deplore the limited present use of technological forecasting. However, even if it does not show explicitly, technological forecasting is necessarily present in most decisions, such as decisions to invest in constructions, equipment, research, and so on.
3. The evaluation of the impact of technology on environment, institutions and behaviour patterns has not been dealt with in this speech. This topic, in view of its scope, must be approached separately and might be considered on another occasion.
4. The Commission on the Future recommended in the Lamontagne Report, is, in my opinion, one of the best instruments for the co-ordination of efforts concerning the development and diffusion of technological forecasting methods in both the private and public sectors.

5. For its part, as already announced, the Economic Council of Canada intends to examine various problems and opportunities related to the long-term future. The studies that will be made will, I hope, help those using technological forecasting.

NOTES

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